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...AL REVIEW, JANUARY 2ND, 1942 JAN 26 1942 MILL CONVERSION SCHEME

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...ol. CXXX. No. 3345 JANUARY 2, 1942 6d. WEEKLY

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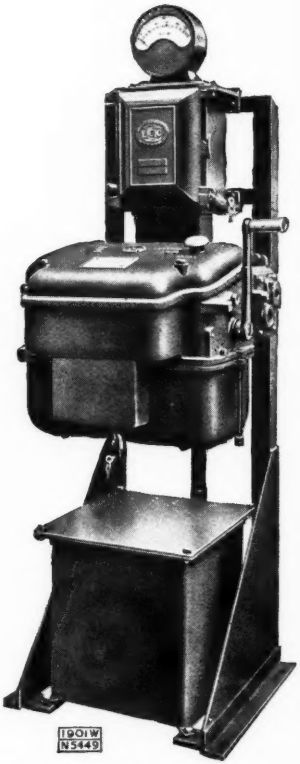

The illustration shows a medium-size auto-transformer panel with isolator and ammeter

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ELECTRICAL REVIEW

Volume CXXX — No. 3345

Friday, January 2, 1942

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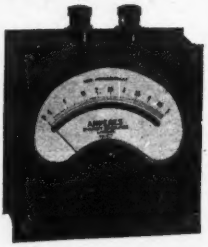

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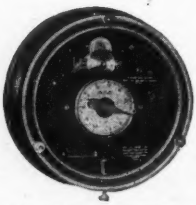

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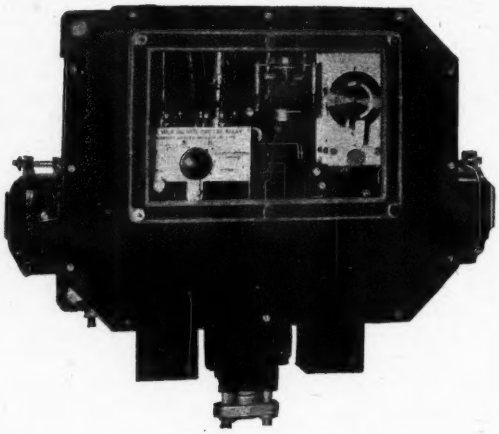

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXX. No. 3345. JANUARY 2, 1942 6d. WEEKLY

Holding our Own

Confidence in the Industry's Future

THE history of the electrical manufacturing industry has been one of adaptation to meet constantly-changing conditions—very largely of its own creation. It is therefore not surprising that it has been better able than most to turn over from peacetime to wartime production. Not that this has meant a revolution, for a substantial part of its ordinary production fits into the war programme. It is only in particular branches—the domestic appliance one, for instance—that the change-over has been drastic.

It is largely on account of this adaptability that the industry has been able to report another successful year. Most of its principal units have maintained or even increased their turnover, but their shareholders have not always benefited, for the tremendous increase in taxation has in many cases resulted in a lower net return. In the "Equipment and Manufacturing" section of our usual table of electrical investments we quote the shares of fifty-seven companies. Of these thirty-three maintained their dividends in 1940-41, seventeen reduced them and only seven increased their distribution. The industry may therefore justly claim that although it is going "all out" to meet the country's needs it is not taking advantage of those needs.

Many difficulties were encountered and surmounted during 1941. The materials position was no easier than in the preceding year but supplies under the Lease-Lend arrangements with the United States prevented any very serious deterioration. The man-power problem was troublesome, but "dilution" measures, including the employment of more and more women, enabled work to go on at an increased rate, but not of course without imposing a much greater strain upon managements and supervisory staffs.

With as much war work in hand as they can cope with, those concerns whose business consists largely of manufacture for export have not felt the full effect of the loss of overseas markets. It is to be hoped that they never will; that one result of the war will be the restoration of our export trade to allow the industry's greatly expanded resources full scope.

But our immediate job is to get on with the war and finish it in the shortest possible time. Until victory is achieved the future must be left to take care of itself to a great extent. This does not mean that electrical manufacturers should disband their export organisations and allow all links with their overseas customers to be broken. On the contrary, in spite of present conditions, they must do all that is possible to keep open the lines of communication, reminding their customers that although they are temporarily "otherwise engaged" the time is not far distant when Britain will once again be able to deliver the goods.

With an increasing demand for men and the adverse effects of the war in the Pacific

upon supplies, the outlook for the coming year is obscure. But, whatever the future may hold, we have no doubt that the electrical industry with its tradition and inherent strength is as well-placed as any to meet and overcome all handicaps.

Electricity Supply

So far as electricity supply is concerned there is little we can say at present. That branch of the electrical industry has also carried on successfully in spite of the difficulty of obtaining plant and fuel. Many undertakings have had to bear air-raids which have made heavy calls upon the endurance and skill of their employees, calls which have been cheerfully and bravely met. The country, both industrially and domestically, has a great deal to thank the electricity supply industry for. Electrical contractors, too, have played a most important role in the carrying on of the war and many of them have made considerable sacrifices. Often they have had to abandon businesses, built up by patient effort during many years, to devote their skill to the country's service in industry or the Forces.

Tax Reserve Certificates

As a consequence of the heavy taxation now imposed upon them all business concerns are compelled to hold in readiness cash resources to meet the demands with the result that bank balances have been swollen to an unusual extent. Killing two birds with one stone, the Treasury has introduced Tax Reserve Certificates which represent in effect payment of taxation in advance. These will enable the taxpayer to put his reserved funds at the Treasury's disposal, receiving a low rate of interest, and to use the certificates for the payment of taxes as they fall due. The idea is a good one for bank deposits are still at an inordinately high level.

Reversed-cycle Heating

DATA for the first year's working of one of the largest heat-pump installations in the United States to be used for heating an office block in winter as well as for cooling it in summer are given in *Power*. Operation has introduced no appreciable difficulties and the consumption of electricity for space heating is said to be only about 40 per cent. of that previously required for direct heating. Capital charges are, however, the most considerable item and these are higher than they would ordinarily be owing to the severity of the winters in Connecticut, more equipment being needed for heating than for cooling. Unfortunately the particulars are insufficient to denote whether the additional expenditure on these is justified, though general results appear to be satisfactory.

Australian Cable Industry

A FURTHER step in the development of the Commonwealth's secondary industries has been proposed by the Australian Tariff Board. It takes the form of a bounty upon the products of the Australian Cable manufacturers, among whom is a concern established under the auspices of C.M.A. companies in this country. The average annual requirement is put at £1,200,000, and although at present the two local factories are able to produce only a fraction of this the Board visualises an ultimate approach to self-sufficiency.

Diverted Power

REASONS why American utility companies will have to wait for a good deal of the power plant which they had on order are given by the *Electrical World*. Most of the turbines are required by the U.S. Navy which has fifteen battleships, each requiring from 120,000 to 180,000 HP, under construction besides twelve aircraft carriers (upwards of 120,000 HP each), fifty-four cruisers (100,000 HP) and 193 destroyers (40,000 HP). In terms of kilowatts, says our contemporary, this adds up roughly to 12 million to be built for the Navy by the end of 1943 or early 1944.

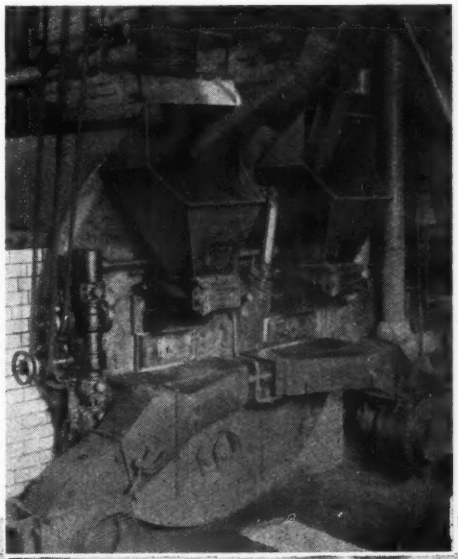
Fuel for Radio

A CORRESPONDENT to *The Times* has estimated the yearly consumption of coal for supplying current to the eight million broadcast receivers in Great Britain at one million tons. Allow- for battery sets, this estimate seems to us to be quite three times the amount probable and to assume an addiction to listening-in for many more hours a day than most people would find amusing. Nevertheless, even the lower figure represents more than 2 per cent. of the total coal burned in public generating stations. It is equivalent to some 5 per cent. of the consumption of electricity for domestic purposes and is almost half as much again as that required for pre-war public lighting.

Mill Conversion Scheme

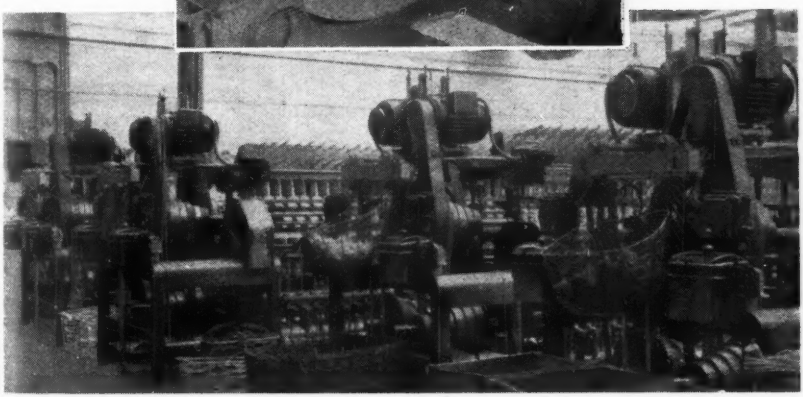
Private Generation and Public Supply

AT the mill at Lindley, Huddersfield, of Smith & Calverley, Ltd., where something like 20,000 yards of cloth are produced per week on a normal programme, the entire plant has recently been converted from steam to electric driving and there is now a total of about 650 HP of motor power installed. A recent visit to the mill revealed to us a careful balancing of the private generation against public supply, in accordance with the low-pressure process steam requirements throughout the mill, mainly for dyeing, and an ingenious adaptation of both gear and belt transmissions in the solution of some difficult speed problems encountered in applying the new high-speed driving units to existing low-speed shafts and machines, embracing both group and individual drives. Because of the outstanding influence exerted on the whole mill driving scheme by the process-steam requirements it will be well in this case to deal with the private-generating plant separate from, and prior to, the mill processes and drives.



The steam source is an 8-ft. by 30-ft. 160-lb. per sq. in. Lancashire boiler which is served by a Worthington Simpson feed-water steam pump and a 4-HP motor-driven bucket coal elevator *via* an overhead hopper with gravity chutes to the twin furnaces placed over the travelling stoker. Balanced draught is provided by a 1½-HP motor - driven forced-draught fan supplementing the free-inlet air at the boiler front and a 25-HP induced-draught fan at the chimney base.

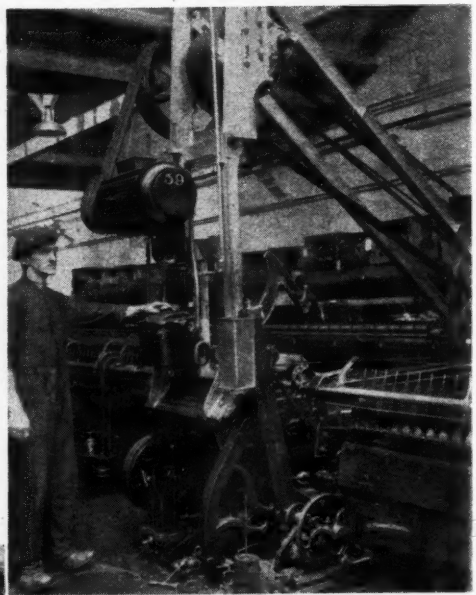
The arrangements for boiler feed - water are very unusual and have a consider-

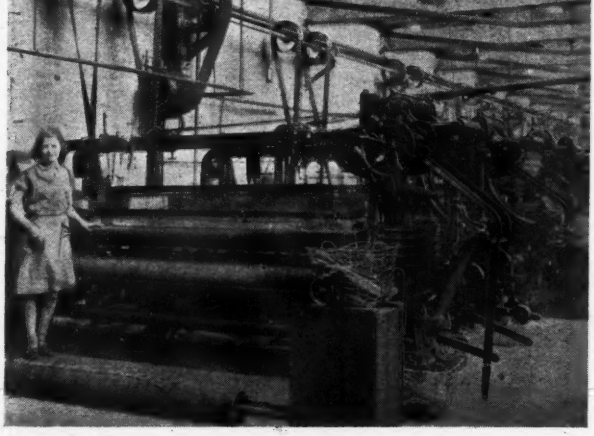


The steam source is an 8-ft. by 30-ft. 160-lb. per sq. in. Lancashire boiler (top). Below : Each twisting frame has two separately driven spindle lines and each motor has an independent emergency switch ; the picture shows the heads of four frames

able bearing on the economic use of process heat and, consequently, on the private generation and public-supply scheme. There is the usual Green's economiser at the back of the boiler, but an extension to this serves as the basic heating unit for a 6,000-gallon water tank which serves wool-dyeing and scouring processes, staff houses (for domestic purposes), office radiators, etc. The heating of this tank from the economiser extension is boosted by a calorifier which is served by a tapping off the 10-lb. per sq. in. steam system through an Arca regulating valve which is thermostatically controlled to open out at about 180 deg. F. The booster receives make-up water from the town supply and a ball-valve tank overhead, while the water in the system as a whole is kept continuously on the move by a 7.5-HP, 1,420-RPM "Mo-pump."

The actual feed water for the boiler and economiser proper system is delivered by gravity from another overhead tank to which all the trap discharge throughout the mill is fed by means of a Nash vacuum pump which draws the condensate to a central point where it creates a pressure and delivers its "haul" to the boiler feed tank. This vacuum pump has a direct transmission from a 4-HP, 1,460-RPM motor through a flexible coupling.





Right: Each mule spinning machine is individually driven by a 10-HP motor at the front headstock. Below: A typical weaving shed drive is for nine looms *via* a shaft driven by a 15-HP motor

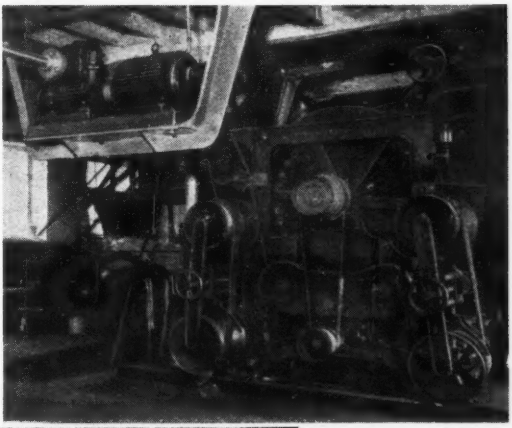
The boiler delivers the major portion of its high-pressure steam to a generating set the pass-out of which is used for process purposes, but to provide for the process-steam low-pressure demand exceeding the supply a tapping from the high-pressure steam main will supplement the 10-lb. steam through an Arca regulating valve. Another similar valve on the low-pressure steam system will release steam to atmosphere in the event of a sudden cessation of demand in the mill.

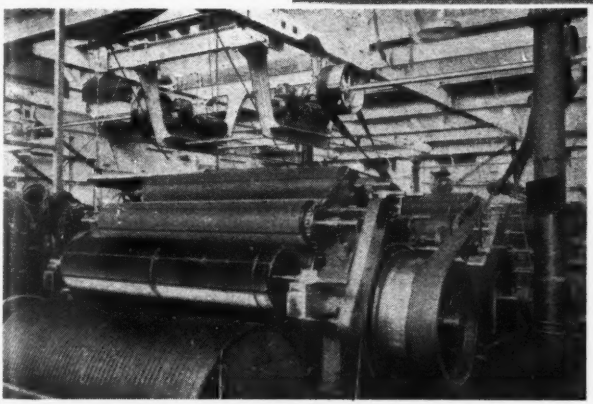
The generating set consists of a 300-HP Belliss & Morcom pass-out engine directly coupled to a 250-kVA, 400-V, three-phase, 428-RPM Mather & Platt alternator. A novelty about the engine is that the cylinders

are not lubricated normally, so as to avoid the passage of oil in the pass-out steam over to the dyeing vats; saturation of the steam alone is relied on for the provision of the necessary lubrication.

In the separate substation a public supply is received at 6.6 kV and transformed to 400 V. Although there is provision for interconnection at 400 V between the public supply and private generation systems, the two schemes of distribution are normally run quite independently and the resultant working of the scheme as a whole on a "fifty-fifty" basis under fairly widely varying conditions points to excellent conception in the design stage. The main distribution in either case, *i.e.*, private generation or public supply, is effected by a similar scheme which, in the case of public supply, embraces an arrangement of English Electric oil switchgear with a main power circuit-breaker serving a closed-in busbar from which four departmental switches are fed. Power distribution is at 400 V, three-phase, and there is a similar main switchgear arrangement for the purpose of lighting distribution at 240 V.

In considering the electrical applications to the various mill processes which we outline in sequence in the following notes, it must be borne in mind that the original mill-driving scheme was one of large steam group drives, because this is essential to an understanding of the details of the present converted installation. The major raw material for the mill is raw wool which, after being roughly hand picked from bales, is passed directly into the boiling dye vats, which are fed from the 6,000-gallon tank referred to, and brought to, and maintained at, the boil by the 10-lb. steam. Dyed wool is first treated in an hydro-extractor which removes about 60 per cent. of the moisture. This extractor has bracketed vertically on its outer case a 16-HP motor from the driving pulley at the bottom of which is a 3-to-1 reduction transmission by V-belt to the extractor spindle, imparting to this a speed of 500 RPM.





Above: A double-way reducer is a novel feature of the finishing department. Left: Each scribbling machine is served by a 10-HP motor directly driving a 9-to-1 speed-reduction gear

The comparatively dry wool is completely dried on the continuous perforated-slat conveyor in the chamber of a very modern drying machine. The chamber measures roughly 20 ft. long by 6 ft. wide and 10 ft. deep, and the conveyor is situated about halfway down the chamber. Above the conveyor are nests of gilled heating tubes which can be supplied with either l.p. or h.p. steam. Six fans below the conveyor draw heated air from the tubes down through the wool on the conveyor and circulate it up round the sides of the chamber back to the tubes again. A 12½-HP motor drives the six fans, the main conveyor referred to and a short feeding conveyor at the front end of the machine. Transmission is first by belt to a

countershaft with a reduction from 750 RPM to 200 RPM, and from the countershaft there is belt transmission to the first unit in the line of fans with a speed increase up to 900 RPM; while from fan to fan along the line there are 1-to-1 ratio secondary transmissions. At 3-to-1 reductions there are other transmissions by belt from the countershaft to the conveyors.

Teasing, *i.e.*, breaking up the fibre masses by toothed rollers, is the next operation after drying, and two production teasers and a sample teaser are group-driven from a 35-HP, 960-RPM motor with belt transmission of 3-to-1 reduction ratio to the line shaft and 4-to-1 to

Group drives in the scouring department; 20 HP for about four machines

the machines. Operations in the scribbling room where the wool is next treated involve progressively the combing out of the fibres through many toothed rollers in sequence operations, and here there are excellent examples of the adaptation of the high-speed motor to existing low-speed shafts by means of gear reducing units. Each machine is served by a 10-HP motor directly driving, through a flexible coupling, a "Radicon" speed reduction unit with a ratio of about 9 to 1 and serving a line shaft normally disposed to the motor shaft from which there is further belt transmission to the machines.

The product of the scribbling machine is a sort of coarse thread or "slubbing" which is wound on bobbins and passed to mule spinners for conversion into weft or warp threads. Each mule is driven individually by a 10-HP motor mounted complete with its starting equipment on the front headstock of the mule. There is V-rope transmission to the mule pulley with a 3-to-1 ratio reduction from 750 RPM. Fancy effects are imparted to the wefts or warps by twisting machines, each of which has two sides of 100 spindles each. A 4-HP motor serves each line of spindles, *i.e.*, two motors per machine, and there is V-belt transmission first to the machine pulley and later variable-speed transmission through cone pulleys to the spindle driving system. The speed range afforded by the cone pulleys is from about 200 RPM to 600 RPM.

In addition to the main starter switch for each twisting machine motor there is a secondary switch which can be operated to shut down and start up the motor quite independently of the main switch from any point along the spindle line. This is effected by imparting a horizontal movement to a bar right along the front of the machine, and, in turn, to the lever handle of the switch at the end of the rod.

Before the wefts and the warps are introduced on the looms the threads from the warp cops delivered by the mules are arranged on the large winding wheels of the warping machines in the correct order. A line of about ten warping machines is served by a 10-HP motor through a 9-to-1 ratio speed reducing gear.

The power requirements of the looms vary according to both the size of the loom and the quality and gauge of the product, but generally it may be said that the requirement is about 1½ HP per loom. A typical drive in this department is for nine looms, each being belt-driven from a line shaft which is served by a 15-HP, 975-RPM motor *via* a 5-to-1 ratio V-belt reduction unit. Scouring and milling are, respectively, cleansing and softening operations which require similar driving arrangements, and the keynote of the department from this aspect is the arrangement of group drives, each for about four scourers with a 20-HP, 960-RPM motor and a 9-to-1 gear reducing unit. In some cases there is V-belt transmission and bigger group drives.

A 16-HP hydro-extractor which first treats the scoured and milled cloth has driving arrangements similar to those in the dyed-wool department. Tentering involves drying the cloth while it is held taut on the conveyors in a steam-heated chamber. The conveyor is driven by a 10-HP motor with a 3-to-1 ratio reduction V-belt transmission, while a 2-HP motor-driven Keith, Blackman fan removes the moisture from the machine. In the finishing department the loose fibres on the cloth surface are cropped by revolving knives on the lawn-mower principle, and the "jerries" on which these operations are carried out are the subject of group drives with 25-HP motors and

gear reducers. An elaborate trunk dust-extraction system in this room which removes the loose hair immediately from each machine has a 7½-HP motor-driven fan. A double-way reducer, *i.e.*, with shaft transmission both sides of the "Radicon" unit is a novel feature of this department.

In some cases dyeing takes place after the production of the cloth, and for this purpose there are in the piece (cloth length) dye house, dyeing vats each surmounted by a winch which continuously draws the cloth through the dye. Each dyeing vat is individually driven by a 3-HP motor with a Croft reducing gear and push-button control for starting, stopping and reversing. There are also in this department a 4-HP motor-driven wringing machine and an 18-HP motor-driven hydro extractor.

Removal of the steam from the atmosphere in the dye house is an interesting scheme which first involves lifting the steam to the upper portion of the room by means of heating coils in a duct served by a 2-HP motor fan, and expelling the steam through the wall at the upper part of the room by a similar fan. General heating in most parts of the mill and particularly in the weaving sheds is by 10-lb. per sq. in. steam and motor-fan unit heaters. Lighting throughout the mill is afforded by 300-W lamps in Benjamin RLM reflectors.

All the motors employed in the mill, which appeared to be of Horace Green, English Electric, Brook & B.T.H. manufacture, are squirrel-cage machines, and up to 10 HP they are switched direct-on-line; above 10 HP they have star-delta starting. Most of the starters are Ellison products. There are some excellent motor housing schemes throughout the installation. Here a motor is nested in a recessed wall, there cradled and suspended from the roof girder work, or one may see a particularly neat stanchion-mounted job; in every case there is a special reason for the method employed, which may be lack of head room or floor space.

We are indebted to Smith & Calverley, Ltd., for permission to visit the mills and to Mr. S. Wright, chief engineer, for his help in collecting information for this article.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AS we briefly reported last week, **Mr. F. B. Collard,** contracts manager of Callender's Cable & Construction Co., Ltd., who joined the company in May, 1895, has retired. Among the many important underground cable contracts for which he was responsible were the laying of a 6,000-V trunk main from Wallsend to Newcastle in 1901, when this voltage was considered very high. He was also in charge of the Metropolitan Electric Tramways contract in Middlesex, which was commenced in 1902 and continued for seven years. This was the largest tramway electrification contract ever undertaken and included 57 miles of double track. In 1914 he was chief of the South Midlands District in connection with the G.P.O. development scheme. He was appointed engineer for the London District in January, 1923, and became responsible for the laying of super-voltage cables in many parts of London and surrounding districts for all the important London electric power companies. In June, 1929, he became contracts manager.

Mr. F. B. Collard

Mr. C. H. Frankland, A.M.I.E.E., who has been appointed manager of the Underground Section of Callender's Contract Department from January 1st, entered the company's service in December, 1910. He has been engaged on all types of cable contracts, including telephone work such as the London-Guildford trunk line carried out soon after the end of the last war, and the Jersey State telephone contract undertaken in 1923. Since June, 1929, he has been engineer-in-charge of the London District and the South of England Area for contract work, and has been in charge of many notable super-voltage contracts carried out for various London electricity supply undertakings.

Capt. O. C. Robson, B.Sc., A.M.I.E.E., of the Electrical Department of the South-East London Technical Institute, has been awarded the O.B.E. in recognition of work undertaken in circumstances of great danger. He is with an R.E. bomb-disposal unit.

The Electricity Staffing Sub-Committee of Stoke-on-Trent recommends that the annual increments of the salary of **Mr. T. Lockett,** manager of the City Electricity Department, shall be increased from £50 to £100 per annum, the first to be payable on April 1st next.

Col. J. C. Dalton, manager and secretary of the County of London Electric Supply Co., has resigned his membership of the London and Home Counties J.E.A. and **Mr. H. J. Randall,** managing director of the City of London Electric Lighting Co., has been appointed in his place.

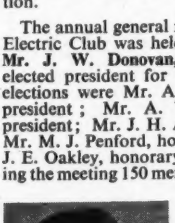
Mr. P. Betteridge has resigned from his position with the Coventry Electricity Department, to take up the post of meter superintendent to the Milford Haven Urban District Council. He was previously for three years with the Wellingborough Electric Supply Co., Ltd., and has also been with the Northampton Electric Light & Power Co., Ltd., and Chamberlain & Hookham, Ltd.

Mr. R. J. Willis, publicity manager of the Sun Electrical Co., Ltd., has received a commission as acting pilot officer in the Technical Branch of the R.A.F.

We reported in our issue of December 19th that the Belfast Electricity Committee had recom-

mended that **Mr. F. H. Whysall** should be granted a pension of £1,503 upon his retirement from the post of city electrical engineer in March. The Finance Committee has disagreed with this and proposes that the pension should be £939; this, it is said, is calculated by adding ten years to Mr. Whysall's fifteen years' service with the Corporation.

The annual general meeting of the Birmingham Electric Club was held on December 19th when **Mr. J. W. Donovan,** B.Sc., A.M.I.E.E., was elected president for the session, 1942. Other elections were Mr. A. M. Fletcher, senior vice-president; Mr. A. T. Haywood, junior vice-president; Mr. J. H. Asdell, honorary secretary; Mr. M. J. Penford, honorary treasurer; and Mr. J. E. Oakley, honorary social secretary. Following the meeting 150 members sat down to luncheon under the chairmanship of the new president, a re-union being held afterwards. A collection on behalf of the Electrical Industries Benevolent Association resulted in £6 14s. 0d. being forwarded.



Mr. J. W. Donovan

In 1910 Mr. G. O. Donovan, M.I.E.E., was elected president of the Club, which was then entering upon its sixth year. His son, Mr. J. W. Donovan, who now becomes president for 1942, was educated at King Edward's High School, Birmingham, and at Birmingham University, where he gained the B.Sc. degree, passing with first-class honours in electrical engineering. After a brief time spent with George Ellison, Ltd., he went to the United States. There he entered the switchgear works of the General Electric Co. at Philadelphia, later going to Cutler Hammer, Inc., at Milwaukee where he spent some years in the engineering department. He returned to this country in 1930 and joined the family concern of Donovan Electrical Co., Ltd., of Birmingham and Stechford, of which he is now a director.

Mr. David C. Prince, president of the American Institute of Electrical Engineers, has been elected a vice-president of the American General Electric Co. in charge of the application engineering-apparatus department.

Appointments of officers have now been made to the five District Man-Power Boards which began operating in Scotland on December 22nd. The Labour Supply Officer for Aberdeen District, **Mr. J. H. Millen** was chief electrical engineer of the London Passenger Transport Board, retiring prior to the outbreak of war. **Mr. J. S. Mitchell,** M.A., B.Sc., Deferments Officer, Dundee District, has been lecturer to electrical trainees at Coatbridge Technical School. **Mr. G. Henderson,** A.M.I.E.E., Labour Supply Officer, Edinburgh District, served an apprenticeship with Bruce Peebles & Co., Ltd., and subsequently held appointments with Lancashire Dynamo & Crypto, Ltd., as a designer, and with Leith and the Clyde Valley electricity supply undertakings as assistant chief engineer. Prior to taking up his appointment as a Chief Labour Supply Officer with the Ministry of Labour and National Service in June, 1940, he was chief technical manager and engineer manager with Bruce Peebles & Co.

Mr. D. H. Abbott, whose appointment as borough electrical engineer and manager at Todmorden was recorded in our last issue, received his technical education at Todmorden Technical Institute and Halifax Technical College. He served his apprenticeship with the Sandholme Iron Co., Ltd., and the Todmorden Corporation, where he became shift engineer. When the Todmorden Corporation commenced taking a bulk supply he was transferred to the mains section, becoming assistant mains engineer and subsequently consumers' engineer. In June, 1937, he was appointed distribution engineer to the Crewe Corporation Electricity Department, which position he has held until the present time. (In our last issue we incorrectly stated that he was deputy manager at Crewe). Mr. Abbott was a part-time lecturer in electrical engineering and electrical installation for twelve years at Todmorden Technical Institute. From 1917 to 1919 he served in the Royal Navy (Electrical Section). Mr. Abbott is an associate member of the I.E.E.

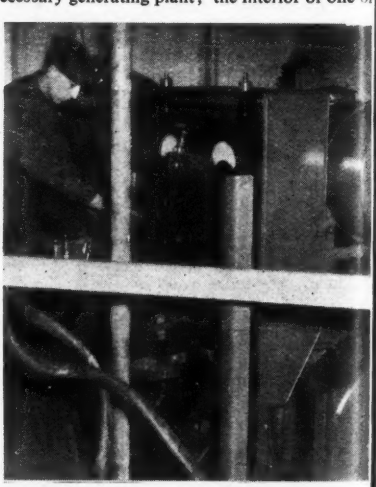
Wills.—Sir Alexander Brown Swan, chairman of the Craigpark Electric Cable Co., Ltd., left personal estate in Great Britain valued at £48,180.

The late **Mr. A. R. Brand,** secretary of the D.P. Battery Co., Ltd., left £8,410.

Floating Searchlight Sets

WHERE the coastal areas of this country are broken into by wide estuaries the "coverage" of the searchlight network is being maintained by lights mounted on barges.

These are armed and equipped with the necessary generating plant; the interior of one of the barges is illustrated. The anti-aircraft personnel is provided with lifebelts and oilskins and their spells of duty are at least a week at a time.



Generating plant in an A.A. searchlight barge

Domestic Thermal Load

A Consideration of Future Electrical Policy

By P. Schiller

IN a previous article* it was submitted that, for most electricity supply undertakings, intensive domestic electrification on the basis of conventional two-part tariffs with a running component of ½d. per kWh would be economic if it produced an annual load factor of at least 60 per cent.

The minimum equipment of the typical moderate-sized all-electric house may consist of:—Cooker and kettle 7 kW, water heater 2 kW, wash boiler 3½ kW, fire in living-room 2 kW, fire in parlour 2 kW, radiators in bedrooms 4 kW, iron, vacuum cleaner, lighting, etc., 1½ kW, making a total of 22 kW.

In the author's opinion, for the reasons given, the current conception of the all-electric house needs revision

A very large group of houses of this kind occupied by people in various walks of life forming a representative cross-section of the middle strata of the population (including artisans) may be expected to show an average annual consumption per consumer of between 5,000 and 10,000 kWh. The maximum weekday peak of the group will occur between 7.30 and 8.30 a.m., during the period of concentrated domestic activity associated with breakfast time, when cooker, water heater, and a proportion of space heaters are in use simultaneously.

Now, the decisive question is, what will be the corresponding "after-diversity" demand per consumer? In their classic "Analysis of the Costs of Electricity Supply, etc."† Messrs. Woodward and Carne gave an after-diversity-demand curve for small fully electrified houses with an installed capacity of 20.7 kW and an annual consumption of 9,500 kWh, which showed a morning peak in the neighbourhood of 4 kVA.

In general, one may legitimately assume that this value will be in the region of 2.5 to 5 kW (a single 2-kW space heater "on" in each house would already account for almost the whole of the lower limit). Combination of the assumed lower and upper limits of annual consumption and after-diversity demand results in the range of load factors given in the following table :—

Average annual kWh per house	After-diversity demand per house	Load factor per cent.
	kW	
5,000	5	11.5
5,000	2.5	23
10,000	5	23
10,000	2.5	46

* ELECTRICAL REVIEW, November 7th, 1941.
† *I.E.E. Journal*, 1932, Vol. 71, p. 852.

Since the combinations of minimum consumption with maximum after-diversity demand and maximum consumption with minimum demand are unlikely, the probable range of load factor could be narrowed down considerably to an approximate average of 29 per cent. and would in no case be anything like 60 per cent.

Another important consideration is this: From the grid load curves published in Mr. Johnstone Wright's presidential address to the I.E.E. in 1939, the aggregate industrial power load on the grid in 1938 can be estimated at round about 3 million kW. The number of domestic consumers was then in the region of 8 million, which gives an industrial power demand per domestic consumer of less than 0.4 kW. If this is compared with the estimate of 2.5 to 5 kW domestic demand per all-electric household it becomes plain that a relatively low percentage saturation of all-electric houses would swamp the power load completely and impress on the system-load curves the characteristic features of the domestic thermal load.

Hence one appears justified in definitely discarding the conventional peak time of 4 to 5 p.m., sticking to which has caused so much confusion in the appreciation of the true implications of the domestic thermal load. Unless a fundamental change in policy takes place, there will be in the future only one critical weekday peak time, namely the region around 8 a.m., and the coincidence of clothes-washing with the higher starting input of industrial machinery after the week-end will tend to make Monday the peak day of the week, with but little diversity between the individual maximum group peaks of domestic and power loads.

Space-Heating Considerations

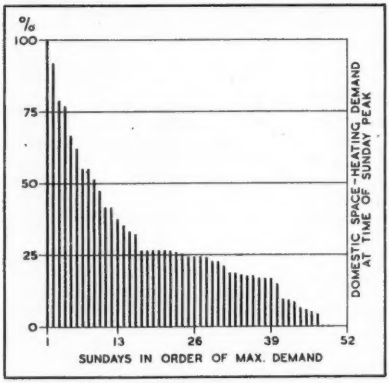
The mid-day peak on Sunday of the domestic thermal load exceeds the weekday-morning peak considerably—since heavy cooking, space heating, and some water heating will coincide on Sunday in the winter.

It has often been assumed that the all-electric house represents *the* solution of the domestic toil-saving question and that all the difficulties experienced and anticipated from intensive domestic electrification, especially in consequence of cold snaps, could be removed if full use were made of space heaters.

In regard to the first of these ideas, it may be pointed out that coal fires are still prevalent and the great convenience of electrical methods

is not enough to justify expectations of eliminating them. No doubt there is a conservative predilection for grates, but the main reason is the extra cost of operation.

The validity of the second idea is inconsistent with the foregoing analysis of the characteristics of the all-electric house. Moreover, space heaters, in addition to those mentioned, are employed in such places as bathrooms, lofts and garages, particularly when the outside temperature is around freezing point. These limited periods of quasi- and full-fledged cold snaps are characterised by the appearance of a form of space-heating load that is quite distinct from "basic space heating." Bedroom heating is equally inelastic, as is the bulk of the incremental living-room heating attending cold snaps.



Graph illustrating the pronounced seasonal character of the domestic space-heating load

Space heaters that are now habitually switched on in living-rooms before a coal fire is lighted later in the day, and more extensively in spring and autumn, could be further utilised in taking over basic space heating.

This line of thought, however, disregards the effect of the use of the electric space heater on the mornings of ordinary winter weekdays in providing a beneficial balance to the lunch-time cooking peak and of its replacement by the coal fire later in the day in relieving the peak from basic space heating. This is of particular importance in connection with the Sunday-midday cooking peak, to which would be added the basic space heating load if electrical. There being very little diversity between the latter and the maximum peak of the rest of the domestic thermal load, its addition could improve the collective load factor only if its own load factor were appreciably higher than that of the remaining load. Unfortunately, the potential load factor of basic space heating is far from imposing, as it is required only during six or seven months of the year, and then for an average of not more than, say, fourteen hours a day. Supposing a perfectly even distribution of the load over this period, the maximum theoretically possible annual load factor works out at between 29 and 34 per cent., and the actual value is bound to be lower. Hence the addition of basic space heating cannot produce any spectacular improvement of the load factor of the collective load.

The incremental demand during cold snaps is only very little affected by the use of electricity for basic space heating. If, for instance, this function of a coal fire is taken over by a 2-kW electric fire, during a real cold snap the consumer will want to supplement it.

Incidence of Heating Load

The pronounced seasonal character of the domestic space-heating load in general is shown in the graph which plots a series of values of demand due to domestic space heating at the time of the Sunday peak, arranged in order of magnitude, and covering one calendar year. The graph is based on data obtained from a municipal undertaking with about 20,000 consumers and roughly 85 per cent. of its sales accounted for by lighting, heating and cooking. It will be noted that for about two quarters the demand was of the order of only 25 per cent. of the maximum, and for one quarter it was practically negligible.

From the perspective of the supply undertaking, space heating is necessarily a function of the difference between the desirable temperature of living-rooms and the fluctuating temperature of the open air, and there is, unfortunately, little diversity between it and other components of the domestic thermal load. Peaks in temperature difference tend in practice to be disproportionately magnified in the peaks of the corresponding space-heating demand.

While at the present stage of development of the domestic load a more intensive use of electricity for basic space heating would produce a certain initial improvement in system load factors, it cannot be looked upon as a panacea for the troubles experienced in orthodox development. Direct application of electricity to space heating (as distinct from thermal-storage) seems to be predestined to auxiliary and occasional uses such as where the value to the consumer in frost-damage prevention is so great that prices much higher than those now charged can be obtained or where the heating is cut off during the system peaks, which entails load control.

A maximum of effort appears to be justified in the development of electric water heaters. In first cost, maintenance, and potential consumption they compare extremely favourably with electric cookers. Controlled electric water heating by thermal-storage appliances presents the best means of improving the domestic load factor.

Steam Condensers

Factors Determining Design and Operation

By Vernon Walker,
A.M.I.E.E.

Notes on the selection of condensers and auxiliaries to meet specific local conditions based on recent American experience

THE basis of selection of, and the specifications for, power-station condensing plant vary widely, as many uncertain components enter into the problem and into the individual assumptions which must be made in establishing basic design conditions. The considerations involved include such items as space limitations, load factor, temperature, quantities of circulating water available, corrosive or erosive water conditions and cost of fuel.

With no space limitations or restriction of water supply, a simple form of specification may call merely for a definite vacuum, a given steam flow to the condenser, and a given circulating water temperature. This permits the manufacturer to offer either single- or two-pass equipment and reduces the question of the most economic condenser to one of fixed charges and pumping costs. Space limitations tend to narrow the field of selection and generally fix the tube length. Tube sizes are influenced by the character of the circulating water, and where algæ, river mud or scale-forming materials are present, tubes of not less than ¾-in. diameter are employed. Water velocities through the tubes do not generally exceed 8 ft. per sec. with clear water in order to avoid excessive tube erosion.

A recent report by the Prime Movers Committee of the Edison Electric Co., states that one large American utility company has adopted a water velocity of 5 to 6 ft. per sec., while another, after extensive investigation, found that 6 to 7 ft. per sec. was the most economical. In one plant, with a velocity of 7 ft. per sec. and one-inch 16-gauge tubes, condensers have to be re-tubed at about six-year intervals on account of the highly erosive and acid conditions of the river water, the tubes wearing uniformly throughout their length.

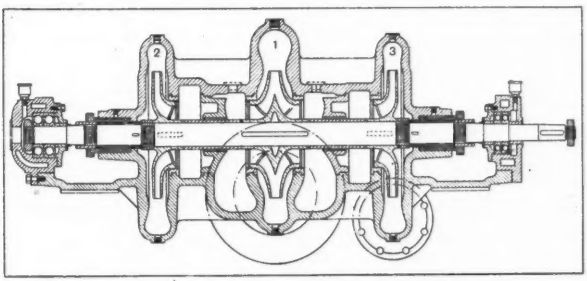


Fig. 1.—Three-stage condensate pump built for an American power company

Of fifteen companies replying to the question as to whether make-up was injected into the condenser, nine replied in the affirmative and six in the negative. Of the nine companies, six believed that satisfactory results are obtained, while three expressed doubt regarding de-æration. The manner of injection determines to a large extent the degree of de-æration obtained. In one instance an improvement in de-æration was obtained by employing a perforated spray pipe in the steam space above the tubes, instead of injecting the make-up into the base or hot well of the condenser. Again, the substitution of a spray pipe with small holes for one with larger holes was found to be more effective. Condensate is usually stored in steel surge and reserve tanks. Concrete tanks have been used, but some have given trouble due to contamination.

The ability of the turbine to utilise high vacuum with cold circulating water may influence the size of the condenser, although in general the performance is specified for a normal average and in some cases for high temperature conditions. The gain in turbine performance with increase in vacuum varies with the design of turbine, the gain being generally less with extraction operation than for straight condensing.

An increase in heat rate has actually occurred at high loadings with high vacuum as a result of an increase in bled steam to heat the cooler condensate. To overcome this, the entering circulating water is maintained at a given temperature in winter by re-circulation. The most economical temperature is found by balancing the gains with higher inlet temperatures and higher loads against losses at

low loads for a given inlet temperature. Controlling circulating water quantity rather than temperature would show higher gains, but control is often limited to operation with either one or two circulating pumps.

In modern condensers, where the temperature of the condensate is the same or slightly higher than that of the exhaust steam, cavitation occurs at low heads on the condensate pump, or when the velocity into the eye of the impeller is high enough to reduce the pressure below the vaporising point of the condensate. In this case the water will vaporise locally, forming vapour pockets in the rapidly moving stream, which impair the pump efficiency, and by their subsequent collapse cause vibration, noise, and often destruction of the pump material. In order to avoid cavitation, water velocity inside the pump has been kept below certain limits. Consequently an increase in capacity will require an increase in the dimensions of the pump and a corresponding reduction in the speed of rotation to avoid excessive circumferential velocity of rotating parts.

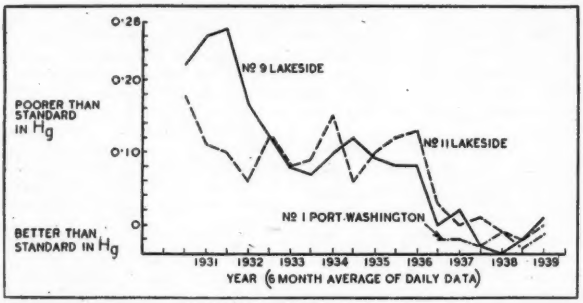


Fig. 2.—Comparisons of exhaust pressures for three large single-pass condensers

Condensate Pump Design

Condensate pumps operate under low inlet heads, leading to excessive dimensions and very low speeds. Consequently this class of pump is designed with speed limitations applicable to ordinary centrifugal pumps under the low head available in the condenser base. Condensate pumps are therefore always liable to some cavitation, but this is minimised by keeping the speed as far as possible within cavitation limits. To combine the greatest possible speed of rotation with least possible fluid velocity, a double-suction first-stage impeller has been used, permitting doubling of the capacity under a given suction head and speed or, inversely, a reduction in suction head or increase in speed for a given capacity.

To seal the hot-well pump automatically against air leakage from the outside, it is advantageous to place the first stage near the centre of the pump, with the subsequent stages distributed on both sides, so as to keep the low-pressure zone entirely removed from the stuffing boxes. A three-stage condensate pump built on these principles for the Pennsylvania Power Co. (fig. 1) has a capacity of 850 gallons per minute at 1,150 RPM, against a head of 175 ft. Steadiness and quietness of operation is attributed to the production of less than 60 ft. head in each stage.

In most cases some kind of hot-well level control has been found necessary, although satisfactory results have been obtained without control, the level being allowed to fluctuate with the load. The condensate-pump discharge may be throttled to maintain the level or automatic valves may be employed to maintain a constant pressure on the pump discharge or to by-pass part of the discharge back to the hot well. These systems help to reduce cavitation in the condensate pump, although with variable-speed drives trouble has occurred from this cause, even though the discharge was throttled to control the hot-well level. This has been overcome by employing a low-head pump between the hot well and the combination condensate and boiler feed pump.

Experience with propeller types of circulating-water pumps indicates that standard materials are not suitable for operation in sea water, since galvanic action causes rapid wear of manganese-bronze propellers and cast iron casings. In such cases all working parts of the pump should be of the same material and 18-8 stainless steel has proved its superiority.

Tube Testing

One American company employing Admiralty and aluminium-brass condenser tubes gives all new tubes a "shock test," the tubes being filled with water and subjected to an instantaneous pressure of approximately 4,500 lb. per sq. in., produced by a falling weight. Of a batch of 10,000 aluminium-brass tubes so tested, eight tubes were ruptured by the test. A second batch of 10,000 Admiralty tubes was tested and fifty-three were ruptured, thirty-two showing leaks at the time of test and twenty more failing under a later air test. It is believed that this test will eliminate tubes that would be likely to fail in service, causing shut-downs of the main unit and salt contamination of the boiler feed water.

Hot-well temperatures considerably in excess of the steam temperature in the neck of the condenser are being obtained by discharging

the heater drains into the condenser hot well instead of pumping into the condensate discharge. By leading the drains into the hot well above the water line, the problem of eliminating oxygen from the heater drain pump has been overcome. With full load and cold circulating water, a temperature elevation of as much as 14 deg. F. above the steam has been observed in the hot well. This elevation is accounted for by the high pressure existing in the hot well, the observed temperature being substantially that corresponding to the pressure.

Sustained cleanliness of condenser tubes, and effective maintenance of condenser auxiliaries have permitted retention of the guaranteed heat transfer rates year after year. In fig. 2 exhaust pressures are compared for three large single-pass condensers covering three to nine years of service life. The data shows that with favourable circulating water, "as new" performance can probably be expected throughout the life of the condenser. Smoothness of tube interiors is of major importance in maintaining the best performance.

INSTITUTION PROCEEDINGS

Automatic Telephone Switching. Power in Ireland.

Long-Distance Telephony

THE paper on this subject read before the INSTITUTION OF ELECTRICAL ENGINEERS on December 18th, by Dr. W. G. Radley, Post Office Engineering Department, and Mr. E. P. G. Wright, Standard Telephones & Cables, Ltd., was reviewed in our issue of December 19th.

In the ensuing discussion Mr. A. J. Gill suggested that it might have been better to have chosen frequencies in the part of the speech band where the energy of speech was lower than 750 and 600, say the region of 1,300 and 1,700, where the risk of interference by speech would be reduced. The difficulty of operating the equipment in the presence of speech might be eliminated by the use of filters. There would also be advantages in the use of echo suppressors. There were possibilities of extending this system to enable subscribers to dial other subscribers in different countries, but it apparently involved the use of a ten digit dialling system which was undesirable.

Definition of "Long-Distance"

Sir Frank Gill held that "long-distance telephony" in the general sense must mean international calls. What was needed in international work was a good deal more speed and one way of doing that was to get the connections through more quickly. In the United States operators were on a common technique, but in Europe operators were on diverse techniques and if Europe could be placed in the same position as the United States in this respect, it would be possible to speed up the call not only by increasing the speed of setting up but by the improvement in technique. The question of the subscriber dialling to fantastic distances should not be overstressed at present. That would come slowly.

Mr. B. L. Barnett thought that the working of the system had not quite come up to expectations, largely due to "teething troubles." The maintenance charges were rather higher than had been expected and this, coupled with the capital charges, made the length of line on which voice frequency dialling was financially justified rather longer than had been originally thought. He desired to see the internal service perfected before developments were attempted in international service.

Mr. S. E. Aldrick expressed his doubts as to the suitability of the equipment described; it seemed possible that there might be considerable scope for the development of some form of signalling operating on entirely different lines from voice-frequency system.

Capt. J. Legg felt that considerable progress had yet to be made before arriving at the degree of subscriber control desired; in this country there was no incentive to simplification of operating procedure.

Mr. R. M. Chamney said that a study must be made of all systems to ascertain which was the cheapest, taking into account signalling as well as transmission and service cost for the service required.

Mr. M. S. Snell asked what was the difference between the Post Office and the C.C.I. signal code; this had not been brought out in the paper and a little more information on that subject would be useful. In the suppression of signals from speech in voice frequency work he had always had a sneaking regard for a system making use of the band pass filter.

Mr. T. H. Flowers and Mr. C. E. Palmer Jones also spoke.

Authors' Reply

Mr. E. P. G. Wright, replying to some of the points raised in the discussion, said that it was found difficult to get into the region of 900 and 1,100 and consequently, in order to keep above the 400 cycle level used for codes, 750 and 600 were adopted which would avoid harmonics at the lower frequencies and signals which might cause interference and difficulty in repetition. Any line over about 100 miles long should be regarded as long distance. He denied that the maintenance of the system described was very difficult.

Dr. Radley maintained that the system

described was an engineering proposition but the operating side had to learn a new technique. The Post Office code was developed several years in advance of the C.C.I. signal code, at a time when we had not quite mastered the technique of getting a signalling receiver which would respond to signal components comprising both frequencies simultaneously. For that reason such components were omitted from the Post Office code which, however, would provide all the facilities required or likely to be required in this country.

Radio Engineers' Meeting

IN his address to the London Section of the BRITISH INSTITUTION OF RADIO ENGINEERS on December 13th, marking his election as a vice-president, Mr. L, H. McMichael claimed that in this age of specialisation the necessity for the existence of a professional body devoted solely to radio and allied engineering could not be disputed. He remarked upon the need for specialisation in education, too, to assist in planning and affording facilities for examination in radio and allied engineering, thus securing for the profession properly qualified material for employment. Serious thought must continue to be given to education, for the development of the industry would require a reservoir of young people who had been properly taught the principles of the profession they were seeking to adopt.

The address was followed by a paper in which Mr. J. A. Sargrove described the construction and some of the industrial applications of the barrier layer type of photo-electric cells. He discussed their frequency response and demonstrated a cell in association with a low-frequency amplifier, reproducing the note from a beat-frequency oscillator and the output from a gramophone, employing a cathode-ray tube as the modulated light source.

Irish Centre Paper

SOME recent achievements and probable future trends were dealt with in a paper on "Developments in Electrical Engineering" by Mr. J. C. Costello read recently before the Irish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS. Mr. J. Kenny, chairman of the Centre, presided, and prominent electricity supply men took part in the discussion.

Mr. Kenny advocated decentralisation of electricity supply in Ireland and made a number of suggestions for its realisation. He claimed that additional stations on certain rivers, including the Barrow, Erne, Moy, Nore and Suir, would yield a total of 110,000 HP. He further advocated the erection of turf-fired generating stations in Mayo, Donegal, Tipperary, Galway and Kerry—the two sets of stations to be links in a national chain wherein turf and water would co-operate in maintaining a steady and stable supply of power. Even if the turf-power stations were not as efficient as the super-stations or the coal station, when cheap foreign fuel was plentiful in peacetime, the fractional loss to the consumer would be quite outbalanced by the employment provided.

Mr. Kenny reminded his listeners that the Electricity Supply Board had planned a turf station some years ago at Portarlington, but the scheme was not developed in time to be of use in the present emergency. He next proposed that wind generators should be used to give a stimulus to develop electricity in rural regions where the Electricity Supply Board was not supplying.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, January 22nd, 5 p.m. London. Papers: "A Totally Electrified Cane Sugar Factory," by Mr. L. B. Whitaker, and "Electricity in a Beet Sugar Factory," by Mr. B. Smith.

Wireless Section.—Wednesday, January 7th, 5 p.m. London. Paper: "Aerial Characteristics," by Mr. N. Wells.

Transmission and Meter and Instrument Sections.—Wednesday, January 14th. London. Paper: "Measurement of Protective Gear on Power Supply Systems," by Messrs. Casson and F. H. Birch.

Installations Section.—Thursday, January 15th, 5 p.m. London. Paper: "Some Problems in the Application of Electric Heating to Residential and Commercial Premises," by Mr. W. Gilchrist.

Western Centre.—Monday, January 12th, Royal Hotel, Cardiff. Wartime luncheon, followed by a discussion on "Electrical Supply Problems Arising from the War," to be opened by Mr. W. A. H. Parker. Tickets (6s. 6d. each) can be obtained from Mr. J. B. G. Lewis, hon. assistant secretary, Principality Buildings, Queen Street, Cardiff.

Mersey and North Wales (Liverpool) Centre.—Monday, January 19th, 5 p.m. Liverpool Royal Institution, Colquitt Street. Paper: "The Electricity Supply (Meters) Act, 1936—Its Legal and Technical Implications," by Mr. Alwyn Evans.

South Midland Centre.—Monday, January 5th, 6 p.m. James Watt Institute, Birmingham. Meeting.

North-Eastern Students' Section.—Friday, January 16th, 6.30 p.m. Neville Hall, Westgate Road, Newcastle-upon-Tyne. Paper: "Electrical Musical Instruments," by Mr. P. D. Gibbons.

Association of Scientific Workers.—Saturday and Sunday, January 10th and 11th, 10 a.m. Caxton Hall, Westminster, S.W.1. Conference on "Science and the War Effort."

Association of Mining Electrical and Mechanical Engineers.—Saturday, January 17th. Caerphilly. Paper: "Considerations Regarding the Layout of Colliery Electrical Systems," by Mr. A. W. Kidd.

Electrodepositors' Technical Society.—*Midlands Centre.*—Tuesday, January 6th, 4 p.m. James Watt Memorial Institute, Birmingham. Paper: "Zinc Plating Processes," by Mr. E. J. Dobbs, B.Sc.

London Branch.—Monday, January 12th, 4 p.m. Northampton Polytechnic, E.C.1. Paper: "Practical Problems in Electro-Tinning," by Dr. S. Baier.

Stoke-on-Trent Association of Engineers.—Saturday, January 10th, 6 p.m. Association's room at offices of Robert Hyde & Son, Ltd. Address on "Arc Welding" by representative of Murex Welding Processes, Ltd.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Impedance Losses of Transformers

IN your issue of December 12th, Mr. Nicholson-Steng, discussing the effect of temperature variation on transformer losses, stated that the normal iron loss was unaffected by temperature.

I do not know whether this has been proved experimentally, but so far as eddy current losses are concerned, it is fairly well established that these decrease with increase of temperature. It may be that the variation in hysteresis loss counterbalances this effect and I should be interested to hear if this is indeed the case.

Chelmsford. J. C. M. SANDERS.

Institution Membership

NO doubt "Twenty" is right when he says in his letter (ELECTRICAL REVIEW, December 19th) that it is difficult to convince employers, unless they are engineers, that being a Graduate I.E.E. implies having received an engineering training.

I know of members of the clerical profession who are Graduates and as such can use the letters Grad.I.E.E. when applying for a post and thus influence the layman as to their engineering abilities. One can understand the suspicion which exists as to the value of this qualification unless full details are known.

It would appear that the rules regarding admission to the examinations need revising in order to safeguard the profession in this direction. In the other leading engineering institutions a candidate must satisfy requirements in certain respects which necessitate an engineering training. Perhaps other engineers have opinions on this very important question.

Shipley. T. H. CARR.

Engineers' Salaries

THE letters of Mr. J. F. Amor and "Designer" on engineers' salaries are highly significant of a new attitude towards the whole question of money. They indicate a growing consciousness of the enormous difference between the value of the goods engineers so greatly help to produce and the engineers' purchasing power.

This is all to the good, because the main economic problem for this generation is how to remove artificial restrictions on purchasing power; restrictions that were the curse of our economic system between the wars, and which may appear again when the present war is over unless steps are taken to prevent it. Therefore the question of an improvement in the engineer's status is very relevant to the greater question of the future of society.

Engineers, equally with other workers, must stand for an increase in their purchasing power, which implies that they must see to it that the economic system of the future will make this possible for all. It should always be borne in mind that under our pre-war economic system an increase in salary did not necessarily mean an increase in purchasing power.

"Designer" has drawn attention to the engineer's very considerable responsibility for the efficiency and competitive value of industry's products. It is evident, considering the level of engineers' salaries, that industry gets technical knowledge and organising ability far too cheaply. This undesirable feature is also present to a marked degree in the case of laboratory and development technical staff. Considering that such staff may be required to develop an article from its inception to its final form, and that their normal work consists in resolving technical difficulties throughout the range of a firm's products, the fact that their salary level is not even up to that of engineering designers is deplorable.

The Association of Scientific Workers' drive to organise for maximum war production is evidence of its fine perception of "first things." That it does not consider that its parallel drive to raise the scientific workers' status is incompatible with this is significant.

Birmingham. DEVELOPMENT ENGINEER.

Munition Production in Canada

THE share of the Hydro-Electric Power Commission of Ontario in providing the munitions and supplies urgently needed in Great Britain and Russia was spoken of by Dr. T. H. Hogg, chairman and chief engineer, in a recent address to the Ontario Municipal Electrical Association.

During the first year of the war the Commission spent more than $11 million on new capital construction, and in the year ended October 31st last the amount spent was about $17 million. The increased industrial load was mainly attributable to munition work, and on the three southern systems there had been a total extra load of 450,000 HP. Also, due to more intensive use of existing plant switched over to war work, actual energy consumption increased proportionately twice as much as the load.

Dr. Hogg went on to say that Ontario possessed the most extensive electrical undertaking on the American continent, and they must see that the power it produced was used to the best advantage in the manufacture of essential war materials. The trend towards electric drive had been more pronounced in Canada than in many countries, and at the present time there was about 5,000,000 HP of electric motors in use.

I.E.E. Benevolent Fund

President's Appeal

IN order to save paper the President's annual appeal for the Benevolent Fund of the Institution of Electrical Engineers is in a much-reduced form this year but should nevertheless call forth as good a response.

The Fund is beginning to feel the effects of the extension of assistance to special wartime cases, a direction from which ever-growing calls may be expected. In expressing his gratitude to regular subscribers, Sir Noel Ashbridge asks them to consider the possibility of increasing their donations. Although he realises that many members are finding it more difficult to meet their financial obligations others have received promotion as the result of the war and should therefore be able to afford more.

It is stressed that of the total Institution membership of over 20,000 no fewer than 13,400 do not subscribe to the Fund which reduces the average subscription per member to 3s. 10d.; if these were to give 5s. each, the annual income would be increased by £3,350, and the Committee of Management would be relieved of future anxiety.

Once again the Fund will be deprived of a substantial amount of income through the abandonment of the social events which in the past have contributed substantially; in any event this loss has to be made good and should be made good at a time when practically every member of the Institution is in employment.

Members' attention is drawn to the benefit achieved by their entering into deeds of covenant to pay a fixed annual amount for a minimum period of seven years. With income tax at the present rate, such contributions are, in effect, doubled.

The work of the Committee is illustrated by a selection of examples of cases, in which assistance has been afforded.

Fifty Years' Progress

Ward & Goldstone's Jubilee

THIS year the business of Ward & Goldstone, Ltd., reaches its jubilee. The original company, with the title of J. H. Ward & Co., was established under modest conditions in 1892, the founders being Mr. J. H. Ward and Mr. M. H. Goldstone who had served an apprenticeship with the General Electric Co., Ltd. Mr. A. Goldstone joined the company four years later, and the title was subsequently changed to Ward & Goldstone. Of the original founders Mr. M. H. Goldstone and Mr. A. Goldstone are managing directors; Mr. Jas. H. Ward died in 1932 and Mr. L. Goldstone in 1937.

The products at first manufactured comprised a small range of electrical accessories and light insulated conductors. As the range progressively expanded and the demand increased larger premises were secured, and the production of wires, cables, flexibles and accessories included requirements for the then developing industries, automobile, radio and, later, television.

In September, 1919, the company was incorporated and removed to its present address where its works and buildings, with recent extensions, comprise a floor space exceeding 4½ acres, exclusive of the underground shelters. The buildings include laboratories for testing and research, first-aid centre with modern equipment, canteens, rubber compound mills, a large bakelite moulding and assembly factory, vulcanising sheds, cable and wire works and mills. The steel and concrete underground shelters accommodate over 1,600 people.

A reference to the files of the Patent Office for the last fifty years will confirm the claim of the company to be among the pioneers in the electrical industry. For obvious reasons, information relative to the present activities of the company must be deferred to post-war times. As a matter of interest, fifty years ago the first motive power of the company was a ½-HP steam engine and boiler purchased from a local marine stores; the power to-day is supplied by Salford Corporation Electricity Department at 6,600 V through two 1,000-kVA and one 500-kVA transformers, a total load of 2,500 kVA.

The directorate consists of the following:—Messrs. M. H. Goldstone, A. A. Goldstone, F. W. Clark, D.S.O., M.C., A. Webb, S. Goldstone and A. Maxwell. Messrs. F. W. Clark, A. Webb and S. Goldstone joined the board in 1932 and Mr. A. Maxwell in 1937.

Waste Paper Recovery

Competition to Speed-up Collection

TO stimulate the interest of local authorities in the important subject of waste-paper recovery and to add a sporting touch to the matter a new large-scale campaign commenced yesterday, New Year's Day. The principal feature is a competition with a total of £20,000 in cash prizes presented by a group of public-spirited citizens.

For this purpose the country has been divided into twenty areas and in each of these prizes of £500, £250 and £100 will be awarded to the local authorities who collect the greatest quantities (by weight) of waste paper and cardboard up to January 31st. The figures will include all material collected by waste-paper merchants and voluntary organisations in the local authorities' areas, and certified records will be sent to the Waste Paper Recovery Association, Ltd., 154, Fleet Street, London, E.C.4; these will be the only "forms" used in connection with the competition.

It is a condition of the awards that half of the amount should be given to the Red Cross, the Aid for Russia Fund, the R.A.F. Benevolent Fund, or the Soldiers', Sailors' and Airmen's Families Association. The other half must be handed over to a local charity. The judges in the competition will be Sir Vyvyan Board, chairman of the Salvage and Recovery Board, Ministry of Supply; Sir Patrick Hastings, K.C.; and Mr. Sidney T. Garland, general manager of the Waste Paper Recovery Association.

A noteworthy feature of the scheme is its two-barrelled nature. Not only will it stimulate the collection of the material which is very badly needed for the production of munitions but also aid charities which have been hardly treated by the war. We commend it to our readers and ask them to do all they can to make the competition a success and the month's collection a record one.

Electrical Materials

Supply Conditions in 1941

This review of conditions governing the supply during 1941 *of the principal materials used in the electrical industry has been prepared for us by the Metal Information Bureau, Ltd.*

Copper

PRICES of copper having remained unchanged at the controlled levels which came into force in December, 1940 (£62 for electro), there have been no market movements to attract interest during the past year, but there have been, of course, other factors of importance The high place among strategic materials which is held by copper in wartime keeps attention focused very closely on the maintenance of supplies, and it is a matter for congratulation that at no time have manufacturers engaged on essential Government business been held up for lack of raw copper. Very little copper is being released for other than essential Government purposes.

Throughout 1941 America played an increasingly important part in the provision of essential supplies for Britain, and the extent to which copper ranked among these may be gauged from the fact that towards the end of the year it was stated in America that the provision of some 200,000 short tons a year of metal to countries benefiting under the Lend-Lease Act must be taken into consideration in any calculations affecting domestic supplies. This referred to copper and copper products directly, and did not include additional tonnages involved in finished machines.

The promise to supply Russia with substantial quantities of copper and brass and other war materials to make good the losses she suffered through the German invasion threw an added strain upon the Empire's manufacturing capacity. Nevertheless the works seem to have risen to the occasion, and vitally needed supplies have been forthcoming. Apart from the provision of enormous tonnages of raw copper the Empire is now also manufacturing copper and brass on a large scale, Canada's output of brass alone being nearly ten times what it was before the war. Towards the end of the year serious steps were taken to ensure the most efficient use of all copper and brass scrap, and the present outlook for 1942 suggests that the inevitably heavier calls upon our manufacturers will be successfully met.

In the United States 1941 was a year of growing tightness in copper supplies, despite the purchase by the Metals Reserve Co. (a Government controlled organisation) of all the Latin-American copper output, totalling at full production some 600,000 short tons a year. With America's domestic production running in the region of 1,000,000 short tons a year the extent of America's war effort can be gauged. Demand has all the time tended to outstrip supply, and additional manufacturing capacity on a substantial scale is planned for 1942 which will more than absorb expected increases in domestic mine production.

Lead

There has been a very appreciable change in the lead situation in this country during the past year, which has been occasioned mainly by events in other parts of the world. From the beginning of the war the Empire's lead production has proved more than sufficient for its wartime needs, and in consequence when the United States began to get really busy on its own defence programme, and the production of materials for export under the Lend-Lease Act, it became necessary for the Metals Reserve Co. to supplement domestic output by purchases of foreign lead.

In the first place attention was directed to Mexico, and virtually the whole of the substantial production there was acquired. Subsequently, however, it was found that even this was not enough, and the Metals Reserve Co. made contracts with Empire producers for 140,000 short tons of Empire metal, of which over half is coming from Canada. Naturally this occasioned a much more stringent attitude on the part of the Control here regarding the allocation of lead for non-essential purposes, although supplies for the war industries (among which cable and battery makers occupy a prominent place) were fully maintained.

The provision of supplies for Russia has also tended to increase the call on Britain's output of lead materials for the war. Building continued to absorb but a small proportion of the total lead consumption here, especially latterly. There is every reason to suppose that Empire, plus American, plus South American lead production will be ample to meet the essential needs of the anti-Axis powers, but at the same time it seems obvious that less lead will be released for civilian consumption in 1942 than was the case in 1941.

The war in the Pacific has seriously threatened supplies from Burma and may interfere with the ocean routes from Australia. It is hoped, however, that during the period of easy supplies the authorities here have managed to acquire a useful reserve stock, and the immediate supply outlook is occasioning Britain little anxiety, although any check in supplies to the United States might be a more serious matter. However, the bulk of the United States imports are from countries in the American Continent, and

every effort is being made to stimulate production of domestic output.

Spelter

War requirements have made ever-increasing demands for both zinc and zinc alloys, and a fairly tight supply position was aggravated by the need for helping Russia with these materials. However, by the rigid allocation of available metal for essential purposes only, and the importation of useful quantities from the United States, essential needs have been met, although the demand on the other side of the Atlantic is now likely to be further intensified, and the supply position become acute. Zinc is one of the few metals that the western Axis countries have in abundant supply, but even so it should be possible for the Empire plus the United States more than to match the Axis output, and Japan in particular is likely to have considerable difficulty in meeting her requirements of zinc during the coming year.

The price in Britain has remained unchanged (at £25 15s. for g.o.b.) with supplies rigidly controlled, and control in the United States became more and more complete as the year progressed, and in 1942 all supplies are likely to be allocated by the authorities.

Aluminium

The demand for aluminium has continued to grow rapidly in the past twelve months, but this metal has for the period of the war virtually ceased to be a raw material for the electrical industry owing to the prior claims of the aircraft producers.

Enormous output expansion is under way in the United States, and other countries are also increasing production as rapidly as possible. Aluminium is to-day very much a major metal, and may well, on a bulk basis, have the biggest production of them all in 1942 owing to its high bulk-weight ratio.

Tin

Looking backwards, all the other developments in the tin situation have been eclipsed by the outbreak of war in the Pacific. For months the possibility of such a development had overshadowed the tin market. It kept the United States an eager buyer of all available supplies, although after Russia's entry into the war, and her reappearance as a substantial buyer of tin, both the Metals Reserve Co. and American industrial consumers found it difficult to secure all the tin they wanted at the official maximum price of 52 cents per lb., imposed in August.

United Kingdom tin consumption has not been very remarkable owing to the fact that the output of tinplates here has been rigidly controlled because of the need to restrict steel consumption. Reliance was placed upon America to satisfy Empire and South American orders, but towards the end of the year the United States' own needs made this difficult despite full-scale operations by the tinplate mills there. Accordingly in 1942 there may be some expansion of tin consumption in the Welsh tinplate industry. Japanese aggression resulted in complete control being imposed on the tin markets here and in the United States.

With fighting in the Malayan producing areas, with Thailand already under Japanese control and with the Dutch East Indies closely concerned in the Eastern war, the immediate future of tin supplies is very obscure, but America has enough tin in stock to last for twelve months, and Britain is in no urgent need of additional supplies. In any case the United Kingdom does not draw its raw material from the East but from Nigeria and Bolivia.

The International Tin Restriction Scheme was recommended for renewal at a meeting of the International Tin Committee on December 1st, although Thailand had not agreed to the revised standard tonnages proposed. So far, however, formal ratification by the signatory Governments has not been forthcoming. Production during the year has been virtually unrestricted, quotas having been maintained at 130 per cent. of standard, whilst for January-June, 1942, they are proposed at 105 per cent. of the new basis, which is approximately the same thing on a tonnage basis.

Rubber

Whilst rubber stocks here in the early part of 1941 were on quite a good scale, fears of losses by enemy action gave the market a firm tone, and by early April ribbed smoked sheet had risen to 1s. 2 $\frac{9}{16}$d. per lb. At the end of April a Rubber Controller was appointed, and market activity diminished, accompanied by some easing in prices, and towards the end of the year open market trading ceased altogether. The International Rubber Regulation Committee fixed production quotas at 100 per cent. for the first three-quarters of the year and 120 per cent. for the final quarter and also for the first quarter of 1942.

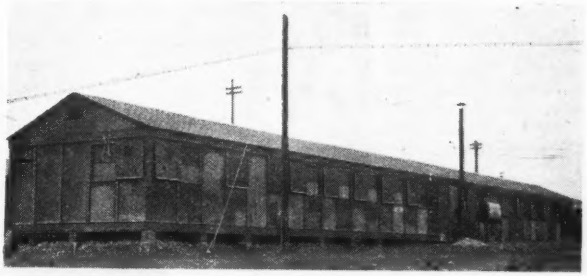
Rubber, like tin, is very seriously affected by the Japanese war, and supplies are likely to be interrupted for the time being. However, back in June the U.S. Reserve Co. (which became the sole buyer for the United States) decided to acquire an additional 100,000 tons for its strategic reserve, and there was a steady reduction in non-essential consumption during the latter part of the year. The outbreak of war with Japan was followed by further restrictions on civilian consumption, both in America and in Britain.

Demand in 1942 is bound to be tremendous, especially with America on a full war production basis, but the supply position is highly obscure pending fresh developments in Malaya, the Dutch East Indies and other Eastern producing areas. The utmost economy will however, have to be exercised until Eastern supplies are resumed, and if the "scorched earth" policy in Malaya has been extended to the plantations, this may be a lengthy period.

American Installation Practice

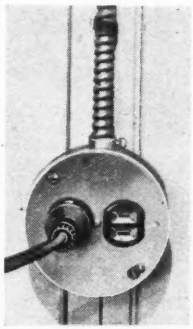
Equipment of a Red Cross Field Hospital Unit in England

A UNIQUE opportunity of learning something of electrical installation technique and apparatus employed in the United States has been provided by the American Red Cross at the Harvard Field Hospital Unit which it has established for the purpose of studying and controlling infectious and contagious diseases. Designed for service anywhere in the world, the unit is entirely self-contained (and incidentally not perhaps so fully electrified, especially with regard to the cooking and heating, as it might have been if its location had been known), all the buildings as well as nearly all the equipment having been made in America and shipped to this country in sections.



A typical hospital block

All the blocks which go to make up the unit—wards, laboratories and animal house, administrative section, nurses' home, canteen, laundry, etc.—are of the same general design, each one consisting of a wooden hut measuring 154 ft. long by 19 ft. wide and having rooms partitioned off, by fireproof boarding from the corridor running lengthwise, to the size required for its particular purpose. Considerable thought has been taken in the layout to secure easy communication between the various blocks, covered ways raised slightly above ground level connecting them.



Universal outlet box with two 15-A plug sockets. Normally the box would be recessed, but the construction of the buildirg makes this impossible

Since the bulk of the electrical equipment is of American manufacture it is constructed for the standard United States pressure of 115 V. An 11-kV supply from the local supply

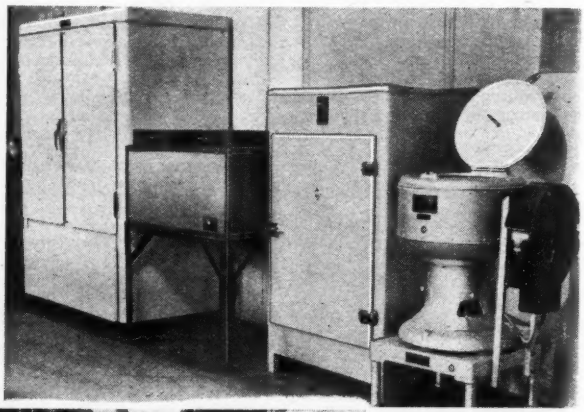
Section of the overhead distribution system, showing some of the pole-mounted transformers

company, one of the Edmundsons Group of companies, is received at a centrally situated substation and transformed by means of a three-phase, 250-kVA English Electric transformer to the standard British pressure of 400/230 V. The main circuit-breaker is a Crompton Parkinson unit.

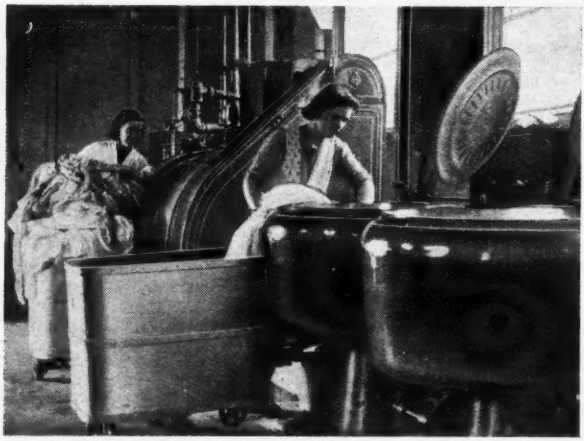
From the substation an overhead distribution system, with supports consisting of British Mannesmann steel tubular poles, carries the 400-V, three-phase three-wire system. In order to provide the 115-V required for the various pieces of apparatus, six 50-kVA and one 5-kVA pole-mounted transformers of American manufacture are erected at points on the route of the distributors. The transformers are single-phase units with the mid-points of the secondaries tapped to provide a three-wire 230/115-V system. The lower voltage wires are suspended on the same poles as those of the higher voltage system. Controlling the lighting and small power supplies are two main 115-V switches with associated panels for supplying the individual lighting and plug points.

The heavier power requirements of the sterilising equipment in the hospital blocks and laboratories are provided by separate services, two 6.7-kW sterilisers being installed in each case, on either side of the three-wire system.

American standard "BX" armoured cable (which is similar to our v.i.r. cable with paper insulation outside) in flexible metal tubing is employed throughout for the interior wiring, which is concealed in the roof space for the horizontal runs and exposed on the walls from ceiling to wall boxes. The flexible tubing is fixed to the wall by means of staples, which



Constant temperature bath, incubator and centrifuge in the laboratories



Washing machine and hydro-extractors in the laundry

having slanting points seem to have a tendency to twist out of position. Originally it was intended to send over the walls and ceilings ready wired, but this was not found possible.

A universal type of outlet box, a 4-in. octagon unit with five knock-outs, is employed throughout the building and all fittings, including lampholders, plug sockets, oil burner and circulating pump switches, nurse call switches, etc., are suitable for use with the same box. When used for plug sockets two 15-A outlets are provided, while each box for ceiling lighting pendants has a plug socket at the side for a portable lamp or other piece of apparatus. Incidentally, to obviate the necessity for separate switches (a consideration in the circumstances since all the apparatus has had to be brought across the Atlantic), all the ceiling lights are controlled by cords attached to switches incorporated in the boxes. All the

boxes are exposed and wired from the back when installed in the ceiling and from the side if in the walls.

To the British eye the boxes and the plugs appear somewhat flimsy and the earthing arrangements are not up to our standards. In view of the "safe" voltage employed this does not, however, appear to be of any great importance, though we noticed in the laundry, where the motors are operated from a 400-V supply, that the supply company had taken the precaution of providing an auxiliary copper strip earth system. While all the plugs used in the building are of the same type we understand that nothing like the same degree of standardisation has been achieved in America as over here.

Wards and Laboratories

Plug points are provided in the wards at the side of each bed and a feature of the nurse call system, which employs lighting visible from the nurses' station, ward kitchen and outside the ward doors, is that each light covers two wards (each ward contains one or two beds only) and is divided into two parts horizontally in order to show which ward is calling. In the laboratories, which are equipped with the most up-to-date appliances, electricity is very much to the fore, the apparatus including constant-temperature chambers, incubators, centrifuges, vacuum pumps, sterilisers, hotplates, refrigerators, inspection lamps, photo-electric cells, etc., all representing the latest American practice.

For the X-ray room a 230-V supply is used. The X-ray apparatus, which is of G. E. Victor manufacture, is a half-wave, single-phase, self-rectifying unit with a maximum output of 100mA. It is a 100-kV synchronous Potter-Bucky diaphragm and is equipped with a fluorscope for under- and over-table use. It has a double-focus spot of 2mm. and a double-focus large spot of 4.5mm.

A large steriliser and a 1-kW hotplate are installed in the operating theatre where, in addition to the general lighting, there is a three-point fitting in which are installed three 80-W daylight lamps. This fitting is of the swivel ceiling suspension type so that the light can be focused to a spot approximately 8 in. in diameter to a given position. A standby portable operating theatre lamp fed from a 12-V battery has a trickle charger incorporated.

As already mentioned, a 400-V, three-phase supply is used for the laundry where motors of American manufacture specially wound for the British standard pressure of 400 V are employed for the rotary washing machines, hydro-extractors and a 10-ft. wide calender. Though not all-electric the main kitchen is very much dependent on the maintenance of a constant supply. The ovens are oil-burning, automatic type, with full electrical controls, while there are important electrical aids in the form of a large Hobart mixer, two large toasters, potato peeling machines, hotplates, and the usual American provision for the manufacture of ice and the storage of food in refrigerators. Actually there are four refrigerators installed in this main kitchen, a 200-cu. ft. "walk-in" type G.E. unit, a feature of which is that the evaporator runs across the top, the cold air accordingly passing straight downwards; a 45-cu. ft. Westinghouse unit; a 6½-cu. ft. domestic type Kelvinator; and a Westinghouse ice-box producing 32 dozen cubes of ice at a time. Refrigerators and hotplates are also provided in each of the ward kitchens.

Heating throughout the hospital is carried out by means of the most up-to-date "Oilomatic" oil-burning system, which is completely automatic. From a central storage reservoir the fuel is pumped by a 2-HP electric motor to float-controlled storage tanks close to each building. In addition to space heating the system provides the domestic hot water supply. Temperatures are electrically controlled by an arrangement of thermostats, the fuel ignition being effected by 10,000-V electrodes, which are struck in response to falling temperatures. Subsidiary circulating motors are installed in each building. It is interesting to note, however, that electric space heating by means of tubular heaters is installed in the animal house, the linen room of the laundry and in the air-raid shelters. The entire electrical installation was carried out by the electricity supply undertaking.

We have to thank Dr. J. E. Gordon and Mrs. E. K. M. Elcock, director and superintendent, respectively, of the hospital, and officials of the supply company, in particular the manager and the consumers' engineer, for their help in preparing this article.

Aluminium Specifications

WE have received a copy of a second edition of "Specifications for Aluminium and Aluminium Alloy Products" (16 pp.). During the last twelve months many specifications have been cancelled or modified and the new edition of the booklet includes all relevant alterations issued up to the end of November.

The form of presentation remains unchanged: a numerical list of the specifications is the basis of the index and is followed by the full range of British light alloys, classified according to the various forms in which each is produced, *viz.*, ingot, sheet and strip, bars and sections, tubes, wire and rivets, forgings and castings. Under each of these headings are shown the appropriate D.T.D. and B.S. Specifications with the proprietary nomenclature and tables of chemical composition and mechanical properties. Finally, there is a tabulated summary of proprietary alloys in alphabetical order, showing the corresponding specifications and the forms of material to which they apply.

Copies may be obtained gratis on application to the Research and Development Department of the Northern Aluminium Co., Ltd., Banbury, Oxfordshire.

New Zealand Topics

Power Shortage. Bulk Supply Charges.

PROBLEMS which have their counterpart in this country were the subject of resolutions submitted by delegates at the fifteenth annual conference of the Electric Power Boards' and Supply Authorities' Association of New Zealand which was held recently at Parliament Buildings, Wellington. The conference—the first to be held since 1938—was attended by nearly 200 delegates and official visitors, and was presided over by Mr. J. A. Nash (Manawatu-Oroua Electric Power Board), president of the Association.

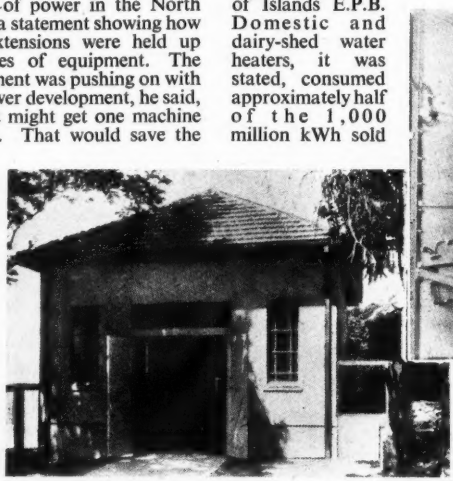
In his opening address the Minister of Public Works (Mr. H. T. Armstrong) referred to one of the most important matters before the conference, the shortage of power in the North Island, and submitted a statement showing how schemes for plant extensions were held up through late deliveries of equipment. The Public Works Department was pushing on with the Waikaremoana lower development, he said, and with good luck it might get one machine going by next winter. That would save the Department £1,000 a day, as the cost of electricity produced by coal was six times as much as hydro-electric power in the North Island, and this was one reason why there had been no reduction in bulk supply charges.

It was revealed in the president's report that the Association had approached the Government about the import restrictions, suggesting that advantage should be taken of the experience and knowledge of their engineers and executive officers in order that the restrictions might be made to bear as lightly as possible on the importing and merchandising sides of the country's electrical activities. Unfortunately it was impossible to convince the Government that this was necessary, although the president felt that if it had been done much of the subsequent inconvenience might have been avoided.

The first resolution before the conference, submitted by the Waitaki E.P.B., was quickly settled. It asked for an assurance that sufficient power would be available in the South Island next year and thereafter, and the Electricity Controller (Mr. F. T. M. Kissel) replied that the chances of a shortage in the South were remote. He hoped that the plant at Highbank would be in operation by the following winter, and any risk of shortage should then be eliminated for a considerable period.

The Thames Valley E.P.B. delegate moved that the Government should be urged to restrict the indiscriminate sale of heavy-consuming devices over the shop counter. Electricity was cheaper than coal, and if coal was at all difficult to obtain people would use electric radiators. On a vote the resolution was defeated.

Rationing of power for water heating was urged by the Bay of Islands E.P.B. Domestic and dairy-shed water heaters, it was stated, consumed approximately half of the 1,000 million kWh sold annually in the North Island for all purposes. The price paid was between 0.2d. and 0.375d. per kWh against a general average of between 1½d. and 2d. per kWh. Some delegates indicated their apprehensiveness regarding the effect of any such restriction on farming, and the resolution was out-voted.



A 750-kW pumpless steel-bulb rectifier substation for supplying DC to the Wellington Tramways; (above) one of the rectifiers

On the other hand, the conference approved a resolution put forward by the Taranaki E.P.B. that the Government should be asked to operate broadcasting stations only on very restricted hours. South Island delegates viewed this with disfavour, feeling that they were being made to suffer for the North Island's power shortage. An estimate by the secretary of the Association that broadcasting was responsible for a demand of 40,000 kW was questioned.

Another mildly " separationist " move from the South was the proposal of a South Canterbury E.P.B. delegate that if the North and South Island accounts were kept distinct it would be possible to get them settled much more quickly than at present. This arose from discussion on a resolution of the Springs-Ellesmere E.P.B. pressing the Hydro-Electric Department to consider a reduction in bulk charges in view of the fact that some power boards were spending more than half of their revenue on the purchase of electricity. The Electricity Controller suggested that the argument was ill-founded, as if the proportion of revenue paid for power was small distribution charges would be excessive, but nevertheless the resolution was approved by the delegates.

From the same source a resolution was tabled that the P.W.D. charge should be based on the average of the three monthly peak loads during the quarter instead of on the quarterly peak load, and this was also carried, although the Electricity Controller pointed out that this saving would of necessity be made at the expense of the P.W.D., and that country boards, who had comparatively small " peaks," would not benefit very much.

Committee on Bulk Supply Charges

On the suggestion of the Palmerston North M.E.D. it was decided that the conference should set up a committee to consider the best means of arriving at some equitable universal scale of bulk supply charges between one authority and another.

Both the Thames Valley and Cambridge Electric Power Boards put forward resolutions with the object of securing greater powers for the removal of trees and of prohibiting the planting of trees, other than low-growing types, within two chains of a public road or of power and telephone lines. These resolutions were considered together and approved by the conference.

When the securing of supplies of steel for reinforcing concrete poles was discussed the Electricity Controller stated that the Minister of Supply would at present offer greater facilities to get shipping space for steel than for ironbark poles as the former needed less room.

The conference rejected a resolution calling upon the Government to reduce the volume of statistical returns required from supply authorities in view of staff difficulties. With regard to control of the manufacture and distribution of locally-made electric ranges it was stated that after some difficulty the Association had obtained representation on the Range Committee. It was agreed that steps should be taken to amend the regulations so that installation re-inspections should be required only every ten years instead of every five. The chairman stated that it was impossible to carry out re-inspection every five years, and nobody was doing it.

Approval was given to arrangements for the amalgamation, with the Association, of the Municipal Electrical Supply Authorities' Association.

The report of the annual conference of the Electric Supply Authority Engineers' Association held the previous day was presented by the president, Mr. J. A. Smith (Horowhenua E.P.B.) and adopted. The business included a resolution stating that while strongly endorsing the principles of standardisation, the Engineers' Association was greatly concerned about the compulsory clauses in the Standards Bill and suggested an amendment by which the clauses could be made mandatory on any specific article after due examination by the interests concerned. The presidential address to the Engineers' Association was given by Mr. M. Cable, M.I.E.E. (Wellington), who reviewed steam plant development and its bearing on the Dominion's power system.

At the Secretaries' Branch conference the outgoing president, Mr. G. E. Fowler (Central Hawke's Bay E.P.B.) presided. He is succeeded as president by Mr. G. A. Ammundsen (Wanganui-Rangitikei E.P.B..) One of the questions raised was the attitude of the State Housing Department in providing gas cooking facilities together with electric lighting and heating in houses at Levin, and it was decided to make representations that where there was a domestic rate involving both cooking and water heating the Department should not separate them.

Progress at Wellington

MR. M. Cable, M.I.E.E., general manager of the Wellington Electricity Department, reports that during the year ended March 31st last 125.3 million kWh was sold, an increase of 12 million kWh, compared with the previous year. Of the total the greater part (73.7 million kWh) was sold for heating, followed by power (19.5 million kWh), private lighting (18.3 million kWh), tramways (11.8 million kWh) and street lighting (2 million kWh). The average price was 0.88d. per kWh. The number of consumers increased from 40,429 to 41,094. Total revenue was £465,312 and there was a credit balance of £46,863. At the beginning of the financial year a new ten-year contract for bulk power from the Government Hydro-Electric System came into operation under which the Corporation undertook to purchase the whole of its requirements on the maximum-demand basis and to operate its 25,000-kW steam plant in accordance with the requirements of the Public Works Department.

Of the 50 million passengers carried by the Wellington transport undertaking during the year ended March 31st last, more than 48 million travelled on the trams. Altogether 4.4 million tram-miles were run, with average receipts of 27.15d. per mile and working expenses of 21.20d., leaving a profit of 5.85d. per mile. On the other hand, the bus revenue was 19.04d. and expenses exceeded this by 4.25d. Mr. Cable records the improvement of access to the western suburbs through the completion of tramway track construction between Lambton Quay and Tinakori Road.

COMMERCE and INDUSTRY

Steel Allocation. Summary of Regulations.

Tax Reserve Certificates

PARTICULARS have been issued of the new Tax Reserve Certificates which the Treasury has introduced as a means of conserving funds for the payment of various forms of taxation. They became available on December 23rd at all the principal banks and are issued in denominations of £25, or multiples thereof, fully paid at the time of application.

Interest is credited monthly at the rate of 1 per cent. per annum and it is free of income tax. The certificates will be accepted with accrued interest for the payment of income tax, sur-tax, National Defence Contribution, Excess Profits Tax, Land Tax and War Damage Contribution.

Purchase Tax Payments

All persons registered under the Purchase Tax should remember the need for prompt payment of the tax. The next payment is due on or before January 31st, and the necessary forms, P.T.11, are now being posted to all registered persons. While the vast majority are paying their tax promptly by the prescribed dates, some have not done so and a number of prosecutions have been necessary, in which the Courts have imposed substantial penalties in addition to the tax.

Export Control

Under the Export of Goods (Control) Order No. 44 (S.R. & O. 1941, No. 2014), which comes into force on January 6th, export control is extended to cover further types of metal manufactures and machinery. Licences will, in future, be required to export wrought hollow-ware, wholly or mainly of iron or steel, of a kind commonly used for domestic purposes; also electric organs.

Steel for Electrical Machinery

By arrangement with the Iron and Steel Control, the Directorate of Industrial Electrical Equipment will, as from January 1st, issue bulk authorisations for iron and steel to manufacturers for any industrial electrical equipment coming within the following categories:—(a) *Rotating machinery.*—AC and DC motors up to and including 250 HP; DC generators up to and including 250 kW; alternators up to and including 250 kVA; convertors and frequency changers up to and including 40 kW; and pulleys, couplings, clutches and gears integral with these machines. (b) *Switchgear and control gear for industrial purposes.*—Starters, regulators and associated equipment for use with the above machinery for any voltage; switches, fuses, switchboards, distribution boards, circuit-breakers and isolators, all ratings up to and including 650 V.

Electrical equipment required for Admiralty purposes, Ministry of Aircraft ground radio or air-borne purposes, and generation, transmission or high-voltage distribution by electricity supply or industrial undertakings is excluded, and in these cases the usual procedure remains in force. "M" forms should not be issued in connection with individual contracts, and if received as the result of an error they must be returned to the Directorate of Industrial Electrical Equipment, Ministry of Supply, 2, Queen Anne's Gate Buildings, London, S.W.1.

Manufacturers requiring further information should apply to the Controller-General of Machine Tools, Ministry of Supply (Code V.A.), Machine Tool Control (D.I.E.E.), 35, Old Queen Street, London, S.W.1. (Telephone: Victoria 9040, Ext. 113.)

Price Control of Domestic Appliances

Under the Prices of Goods (Price Regulated Goods) Order, 1941 (S.R. & O. 1941, No. 2024), which came into force recently, cooking, heating and other appliances and apparatus for personal or domestic use, are added to the list of price-regulated goods under the Prices of Goods Act, 1939.

Wartime Regulations

A bewildering variety of Acts, Orders and regulations continue to proceed from Government Departments, and it is a considerable task to keep abreast of them and to interpret and co-ordinate them. Electricity supply undertakings (and many other concerns and individuals) will consequently welcome the "Summary of the Emergency Statutes, Regulations and Orders affecting the Electricity Supply Industry," published under the auspices of the Joint Committee of Electricity Supply Associations. It has been compiled by Mr. Leslie Gordon, clerk and solicitor to the London and Home Counties J.E.A. and Mr. J. W. Simpson, secretary of the Incorporated Municipal Electricity Association, assisted by Mr. F. Newey, city electrical engineer, Lincoln, and Mr. G. D. Nelliwell, solicitor to the I.M.E.A., and there is a foreword by Col. J. C. Dalton, who until recently was chairman of the Joint Committee.

The scope is so wide that we will not attempt to give an adequate idea of the contents. We may say, however, that the summary covers fifty of the Defence (General) Regulations and over a hundred Statutory Rules and Orders. The comprehensive index occupies over seven pages in small type. The volume (104 pp.) is well worth the 6s. 6d. charged for it. Copies can be obtained from Mr. J. W. Simpson at Wigston Grange, Leicester.

Sequel to Bedford Fatality

At the Bedford Police Court recently the Bedford Corporation was fined £60 and ordered to pay ten guineas costs for failing to take the necessary precautions when an employee was working on a switchboard, as a consequence of which the employee, Mr. Allan Wilson, assistant station superintendent, received a fatal shock.

For the prosecution it was stated that the switchboard in question was operating at 6,600 V. It should have been made dead, or the live parts should have been so screened as to prevent anybody making accidental contact with a live section. The section which Mr. Wilson was cleaning was "dead," but it was possible for a man's hand to slip through apertures in the cubicle and make contact with a "live" section. This had apparently happened in Mr. Wilson's case.

Portable screens were available, but on this occasion were not used in the cubicle in which Mr. Wilson was working.

A solicitor for the Corporation said that the facts were not in dispute, but Mr. Wilson had taken upon himself the work of putting the portable screens into position. The Act laid down that not only the owner or occupier but his agent or servant should take reasonable precautions to prevent a contravention of the regulations. He maintained that by providing screens the Corporation had taken the necessary steps. The accident only came about by their use by Mr. Wilson.

The prosecution said that there was no evidence that screens were put into position or that Mr. Wilson was using them. It was submitted that in the circumstances the defendants had failed to take the necessary precautions.

Nursery Rhymes Up-to-date

The paraphrasing of nursery rhymes as a publicity medium for industry or commerce is not a new idea, but few such efforts have had the

One of the nursery rhyme displays of the G.E.C. at Magnet House, London

advantage of a "stage" so well situated as the display of the General Electric Co., Ltd., which now decorates the facade of Magnet House, Kingsway, London, W.C.2. Based on the four nursery rhymes: "There was an Old Woman"; "Sing a Song of Sixpence"; "The House that Jack Built"; and "Oranges and Lemons," the theme of each is emphasised by drawings and streamers carried out in gay colours. Just around the corner, going towards Holborn, is another G.E.C. display, this time given over to the service of the W.A.A.F.

G.P.O. Women Workers' Wages

An agreement reached between the General Post Office and the Post Office Engineering Union provides for the 2,000 women who have taken over men's jobs in the Engineering Department to be divided into two classes.

All the women involved will receive an extra 3s. per week, while those selected for the higher grade will be given at least 5s. more upon taking up their duties. They will all, in addition, receive annual increments of pay.

Chief Engineers' Salaries

Barking Town Council has adopted the new scale of salaries for chief electrical engineers agreed upon by the National Joint Committee. This new scale will not involve any variation in the salary of the present engineer, Mr. A. B. Catling.

Radio Retailers' Negotiations

Mr. N. N. Lucas, Manchester, secretary of the Wireless Retailers' Association, reports that negotiations are in progress for amalgamation with the National Association of Radio Retailers.

Change of Name

In our issue of December 19th we announced the change of name of Hopkinson's Motors & Electric Co., Ltd. We regret, however, that the new title was incorrectly given. It should have been Hopkinson Motors & Electric Co., Ltd.

Calendars

Illustrations of the numerous ways in which their ball and roller bearings are used—in planes, tanks, lorries, etc., appear on each of the six sheets in the calendar sent to us by the Ransome & Marles Bearing Co., Ltd. Each sheet shows the date for two months, and also the preceding and following months.

"The Lighthouse" is the title of a striking picture chosen by F. W. Brackett & Co. to decorate their calendar with monthly sheets.

A picture entitled "British," showing a young Jack Tar playing his harmonica to an enormous bulldog, decorates the calendar with monthly sheets sent to us by G. E. Wallis & Sons, Ltd.

Smaller in size than last year, the calendar sent to us by British Insulated Cables, Ltd., still shows at a glance the date for the current, previous and following months, and also the current year, last year and next year.

We wish to thank the many of our readers who have sent us the season's greetings which we heartily reciprocate.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed enveloped.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

ROBSON single-phase, squirrel-cage motor.

E.P.L. limit switches.

Thermal overload as fitted to "Allen Bradley" starter, type N.400V.

ELECTRICITY SUPPLY

Many More Price Reductions. Northmet Increase Suspended.

Barnes.—REBATES TO CONSUMERS.—On the recommendation of the borough electrical engineer rebates are to be paid to consumers on the December quarter accounts as follows : (a) rebate equal to the 20 per cent. addition to the unit charge in all cases where this has been made; and (b), rebate of 10 per cent. on the unit charge to all consumers except those few paying for their supplies through prepayment meters or by fixed sum.

Cheltenham.—REDUCED CHARGES.—The Electricity Committee has reduced its charges as follows:—Urban area : A standard rate of 3¼d. per kWh instead of 4d. ; guarantee rate, 3½d. instead of 3¼d. per kWh. Rural area: A standard rate of 5d. instead of 5½d. per kWh; maximum demand rate, 7d. per kWh for the first 125 hours use per quarter of the maximum demand and 1½d. per kWh for all additional consumption. These concessions represent about £3,050 per annum.

ELECTRIC COOKERS.—The electrical engineer recently reported to the Committee that he was unable to obtain any additional electric cookers from bombed areas and submitted revised estimates of the cost of new cookers. He was instructed to purchase new cookers and increase the hire charges to 8s. 6d. per quarter for small types and to 10s. for large cookers.

Chester.—SWITCHGEAR ALTERATIONS.—The Electricity Committee has approved a scheme for switchgear segregation and modification at the main switching station at a cost of £62,025.

East Midlands.—ADVISORY BOARD'S DISSOLUTION.—An inquiry by the Electricity Commissioners was held at Nottingham recently concerning a draft Order for the dissolution of the East Midlands Electricity Advisory Board. Mr. C. E. Allan, of the Electricity Commissioners, pointed out that the Commissioners, after consultation with the Board, were satisfied, having regard to the change in the circumstances of the Electricity District, that it was expedient that the Board should cease to function. If the Commissioners passed the Order through this preliminary stage it would go before the Board of Trade and both Houses of Parliament for confirmation. The town clerk said it was hoped that after the war it would be possible to reconstitute the Board in some form to look after the interests of consumers.

Essex.—HEATERS FOR SIRENS.—The County Emergency Committee has approved an estimate of £1,203 for the provision of heaters for 54 sirens.

Hull.—ASSISTED WIRING SCHEME.—The Housing Committee has decided that, for a period of one year from January 1st next, when houses on the East Hull and Cottingham estates which have been wired by the Electricity Department under the assisted wiring scheme become vacant, it shall be a condition of tenancy to the incoming tenant that he shall take over the liability for the payments under the scheme.

ELECTRIC FISH FRYER.—The Restaurant Committee is to obtain a fish frying range through the Electricity Department at a cost of about £270.

London.—NORTHMET INCREASE SUSPENDED.—As a result of a communication from the Electricity Commissioners the Northmet Electric Power Co. has suspended the recent increases in charges and the matter is to be reviewed at an early date. The Wembley Council had sent a strong protest against the increases to the Electricity Commissioners.

Oban.—CHEAPER ELECTRICITY.—At the December meeting of the Town Council reductions in electricity charges operative from November 15th were approved. The lighting flat rate was lowered from 6d. to 5d. per kWh and the heating and cooking rate was reduced by ¼d. For motive power the new sliding scale is 2½d./1d. (previously 3d./1½d.) per kWh.

Seaham. — PRICE REDUCTIONS. — The Urban District Council has approved reductions in electricity charges which will represent a concession of £4,000 to consumers. They include a penny per kWh reduction for ordinary lighting; ½d. per kWh for heating, cooking, power, etc., and one-fifth of a penny per kWh on the domestic tariff.

Southall.—SUPPLY TO SHELTERS.—In view of the shortage of service cable and the delay and expense likely to be incurred in providing normal services, the Emergency Committee proposes to authorise the borough engineer to arrange with the Metropolitan Electric Supply Co. for the supply of electricity to communal domestic shelters from points of supply in houses nearest the shelters. Estimates are to be obtained for the provision of power points in public shelters or groups of shelters in order that electrical appliances may be installed should the need arise.

Southport.—ESSAY COMPETITION.—At a recent meeting of the Electricity Committee the electrical engineer reported that arrangements were being made for a number of boys from senior schools to visit the demonstration theatre for a series of talks in connection with the National Food Campaign, and that it was proposed to hold an essay competition. He was authorised to purchase suitable prizes in connection with the competition.

TRANSPORT

Ipswich.—ELECTRICITY SUPPLY TO TROLLEYBUSES.—The Council at its last meeting approved a scheme submitted by the Electric Supply and Transport Committee for improving the power supply on certain trolley-bus routes. With plant in stock to the value of £2,207 the total cost of the scheme was estimated at £6,040.

Liverpool.—ELECTRIC SERVICES AND PEAK TRAFFIC.—Mr. A. E. Shennan, leader of the City Council, in an address to the Merseyside Civic Society, said that steam railway operation made it impossible for two of the city terminal stations to deal with a volume of local passengers in any way comparable with the peak loads successfully carried in and out of Exchange Station by the electric services. Electrification of suburban lines into Central and Lime Street stations would result in a great expansion of traffic.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The General Cable Manufacturing Co., Ltd.—Presiding at the annual meeting held on December 19th, Mr. C. W. R. Pantlin (chairman), in referring to the burden of taxation, said that a reserve of £35,000 had had to be made for taxation, including E.P.T., which together with the tax deductions from dividends, meant that the Government was taking more than 85 per cent. of the total profits earned. He doubted whether the Government on balance did not lose by having an E.P.T. as high as 100 per cent. It might well be that the Treasury and the national cause would benefit more if this tax were reduced to 80, or even 90 per cent. He would also urge that some more explicit statement should be made by the Government with regard to the terms and method of repayment after the war of E.P.T. in excess of 80 per cent., covering 100 per cent. periods, as provided under the 1941 Finance Act. At the moment none knew definitely whether such repayments were to be the subject of additions not yet disclosed, or at any rate understood, or even what form the proposed repayments would take. In his view it would be better if the position were clarified without delay.

He anticipated that during the current year the turnover and profit would show a further increase but if that occurred it would not benefit shareholders, who must be content in the knowledge that the company would be making an effective and substantial contribution to the war effort.

Crystalate, Ltd.—In the course of his speech at the annual meeting held on December 19th Sir Herbert E. Morgan (chairman) referred to the benefits of their association with the British Homophone Co., Ltd. and Ebonestos Industries, Ltd., which he said had been progressively felt while the value of collaboration which had been achieved was reflected to a material extent in the satisfactory result of the trading of their company for the year under review.

The Sun Electrical Co., Ltd., reports a trading profit for the year to April 30th of £22,743, as compared with £23,100 for the previous year. After providing for depreciation, etc., and £1,000 for N.D.C. the net profit is £17,424 (against £17,819). The ordinary dividend for the year is maintained at 2½ per cent., directors' fees require £1,500, lease redemption £1,500, and income tax reserve £3,000. The balance carried forward is £2,222 (against £2,503).

E. K. Cole, Ltd., report a net profit for the eighteen months to September 30th of £70,076, from which is deducted £38,000 for taxation. It is proposed to pay an ordinary dividend of 7 per cent. per annum for the eighteen months and to carry forward £25,075 (against £14,997). For the year ended March 31st, 1940, there was a net profit of £26,494, of which £9,000 was reserved for taxation. No dividend was paid on the ordinary capital.

At the annual meeting last Monday the chairman (Mr. W. S. Verrells) said that the results could be considered satisfactory, particularly as the company had voluntarily shouldered certain burdens in order that output should be speeded up and increased. An investment reserve of £40,000 had been created to meet any contingent loss on investments, the present value of which was difficult to estimate. They had disposed of their share interest in Marconi-Ekco Instruments, Ltd.

Although they were devoting their whole energies to their present work they were bearing well in mind the potentialities which they would have to face when the war ended.

S. Smith & Sons (Motor Accessories), Ltd., reports a trading profit of £560,655 for the year to August 2nd, as compared with £535,893 for the preceding year, which with miscellaneous income of £980 makes £561,636. Taxation requires £288,104 and depreciation £101,547, and after providing £500 for directors' fees there is a net profit of £171,485, a decrease of £28,555. As already announced, the preferred dividend is reduced from 21 to 17½ per cent., while the deferred dividend is 37½ per cent. (against 50 per cent.). A sum of £21,000 is allocated to research and contingencies' reserve, and after writing a further £10,000 off patents, the balance carried forward is £47,522.

New Companies

Glasgow's Lighthouse, Ltd.—Private company. Registered in Edinburgh December 17th. Capital, £500. Objects: To carry on the business of electricians, electrical and general engineers, contractors, etc. The directors are C. Edelman and Mrs. K. Edelman. Secretary: C. Edelman. Registered office: 156, St. Vincent Street, Glasgow.

Percival Williams Engineering Co., Ltd.—Private company. Registered December 18th. Capital, £1,500. Objects: To carry on the business of electricians, electrical and mechanical engineers, welders, platers, manufacturers of, and dealers in, lamps, batteries, insulators, transformers, signs, etc. Directors: P. J. Williams, 1, Bow Arrow Lane, Dartford, and two others. Registeredo ffice: 14, Church Road, Sidcup.

Companies' Returns

Statements of Capital

Chislehurst Electric Supply Co., Ltd.—Capital, £50,000 in 50,000 ordinary shares of £1 each. Return dated April 8th (filed October 11th). 40,000 shares taken up. £30,000 paid. £10,000 considered as paid. Mortgages and charges : Nil.

Horley & District Electricity Supply Co., Ltd.—Capital, £200,000 in 200,000 ordinary shares of £1 each. Return dated March 25th (filed October 11th). All shares taken up. £27,608 paid (being £1 per share on 18,640 and 1s. per share on 179,360). £2,000 considered as paid on 2,000 shares. Mortgages and charges: Nil.

Kalgoorlie Electric Tramways, Ltd.—Capital, £250,000 in £1 shares. Return dated October 14th. All shares taken up. £250,000 paid. Mortgages and charges: £60,165 13s.

Telephone Manufacturing Co., Ltd.—Capital, £500,000 in 2,000,000 ordinary shares of 5s. Return dated August 4th (filed October 27th). 1,540,000 shares taken up. £201,562 10s. paid (including £66,562 10s. premium). £250,000 considered as paid. Mortgages and charges: Nil.

Ellesmere Port Electrical Co., Ltd.—Capital, £500 in 500 shares of £1 each. Return dated August 5th. 450 shares taken up. £251 paid. £199 considered as paid. Mortgages and charges: Nil.

R. Marshall Carr, Ltd.—Capital, £500 in £1 shares. Return dated July 24th. 350 shares taken up. £350 paid. Mortgages and charges: Nil.

Mortgages and Charges

Birkdale District Electric Supply Co., Ltd.—Satisfaction in full on November 3rd, 1941, of series of debentures for £25,000 at 5½ per cent., authorised July 14th, 1926, and registered July 15th, 1926.

Piccadilly Electrical, Ltd.—Satisfaction in full on October 29th, 1941, of mortgage registered November 6th, 1935, securing £500.

Bankruptcies

F. Cresswell, electrical engineer, Market Chambers, Mansfield.—First and final dividend of 8s. 11d. in the £, payable December 30th at 22, Regent Street, Park Row, Nottingham.

R. Weaver (Dennis & James), electrician, 189, Regent Street, London, W.1.—Discharge suspended for one year until November 26th, 1942.

H. P. Ansell, electrical consultant, trading in partnership with others at First Avenue House, High Holborn, London, and at City Chambers, Broad Street, Birmingham.—Application for discharge to be heard on January 14th at Bankruptcy Buildings, Carey Street, London, W.C.2.

L. Smethurst, electrical and radio engineer, 155, Footscray Road, Eltham, S.E.9, late of Southampton.—Discharge suspended for three months until February 21st, 1942.

S. V. Knight, electrical engineer, 10A, Watford Way, Hendon Central, N.W.4.—First and final dividend of 1d. in the £ payable January 13th at 11-12, Finsbury Square, London, E.2.

E. C. Ford, electrical contractor, 16, Freehold, Laverstoke, Whitchurch, Hants.—First and final dividend of 8s. 9d. in the £, payable December 31st, 1941, at 12, Rolleston Street, Salisbury.

Liquidations

T. C. Gilbert & Co., Ltd.—Meetings of members and creditors on December 30th at 4, West Cliff Gardens, Folkestone.

British Electrical Export Co., Ltd.—Particulars of claims by February 2nd to the liquidator, Mr. J. Turner. This notice is purely formal, as all known debts have been or will be paid in full.

Baxter & Caunter, Ltd.—Meeting January 28th at Balfour House, Finsbury Pavement, London, E.C.2, to receive an account of the winding-up by the joint liquidators.

Stocks and Shares

STOCK Exchange markets and prices being to some extent nominal, by reason of the intervention of the Christmas Day and New Year's Day holidays in the House, submission of the quotations for the current week would seem to be superfluous. Prices being in nearly every case the same as those of a week ago, our customary tables are therefore omitted. They will be resumed in the next issue of the ELECTRICAL REVIEW, when the usual comparison of prices for the twelve-month will be included in these notes.

Retrospect

Meanwhile, it is appropriate to look back over 1941, and to give in brief outline some of the outstanding features of the financial year as these relate, more especially, to securities connected with the electrical industry. The main tragedies of 1940 were the capitulation of France and the enslavement of other European countries. This year, Germany's failure in the Russian campaign and the entry of Japan and the United States into the war, are historical landmarks which have had their effects upon Stock Exchange markets. Bank Rate, fixed at 2 per cent. on October 26th, 1939, has not varied since that date.

In spite of the political shocks to confidence recently administered by the intrusion of Japan into the war, the resultant fall in prices has hardly touched the strength of such shares as those in the Home electricity supply group.

From the Stock Exchange point of view the outstanding feature of the year has been the compelling influence of the cheap money policy adopted, and steadfastly maintained, by the Treasury. Every now and then a doubt has arisen as to whether the Government would be able to adhere to this policy, but whatever difficulties arose during the twelve-month have been successfully overcome; the hold upon the money market which the Government obtained soon after the outbreak of war has been retained. The policy included a prohibition against all new issues of stocks and shares, an occasional exception being allowed where circumstances dictated its advisability; these exceptions were few and far between.

Shortage of Supplies

The result is seen in investment of money being forced into existing channels, so that not only have prices been maintained, but, under the consistent pressure of investment orders, they have steadily improved. The floating supplies of stock, as mentioned in these Stock Exchange notes with a reiteration which, it is to be feared, must have become

monotonous, have been so easily absorbed that the dealers' books have become depleted to the point of causing embarrassment to people who desire to place money in safety-first securities. Amongst these, there must now, for the first time, be included the ordinary shares of long-established and reputable industrial undertakings.

War Damage Insurance

It is fortunate that for the greater part of the year under review, there have been no such serious air raids as marked the later months of 1940 and the beginning of 1941. Electricity supply shares were then unsettled by apprehensions of the holders that their properties might undergo physical damage which would make serious inroads upon the companies' financial strength. Plans were drawn up for a kind of mutual insurance for companies. Progress was being made with the proposals when the Government foreshadowed a comprehensive War Damage policy that would include all utility undertakings, railways as well as electric, gas and water. Even now, some of the details of War Damage insurance have yet to be fully elucidated, but whatever tremors were previously felt by electricity supply shareholders were effectually dispersed by the Government intervention. Share prices recovered: this section is the firmest of the Home industrial market. The comparative modesty of the yields obtainable from the shares is the most practical evidence of this that could be required.

Delays in Deliveries

It is freely acknowledged that in the case of electricity supply and electrical manufacturing companies' shares, some buyers who made their purchases perhaps weeks—if not months—ago, are still unable to obtain completion of their transactions. Instances are known in which a purchase made a year ago has still not been implemented, although the buyer is, of course, entitled to all the dividends and rights appertaining to the stock. It is a common practice, nowadays, for a broker to buy stock or shares with the proviso "N.T.P."; that is to say, the purchaser undertakes not to press for delivery. He, the purchaser, being fully protected as to dividends and rights, need be in no hurry to part from the money with which he has bought the stock, and he suffers no handicap through not having actually signed the transfer of the shares to himself.

This condition applies more particularly to debenture stocks and preference shares. To such a point has the matter been carried, that some of the Stock Exchange dealers now decline to sell stock at any price, and under any conditions, unless they have it on their books, or know where to obtain it.

This is why, although prices of certain shares may be officially marked to indicate that stock has changed hands, the buyer finds he is still unable to get what he requires owing to the fact that there were bargains, prior to his own, which are due for settlement.

Fluctuations in Foreigners

Brazil provided her bondholders with a pleasant surprise by an unexpected remittance of cash to meet one of her sinking funds. In response, Brazilian issues suddenly shot up in price. Hopes of an increased dividend from the Brazilian Traction Company led to a substantial rise in the shares. Argentine industrials were sympathetically, though but slightly affected. Mexico and the United States showed signs of burying their hatchet and this caused improvement in Mexican utility stocks. Anglo-Portuguese Telephones have pursued a somewhat erratic course. Oriental Telephones doubled their last January's price of 47s. 6d. but lost part of the gain when Hong Kong—where the Oriental Telephone Co. has an important interest—was attacked. Tokyo Electric sixes slumped soon after Japan declared war.

Amongst Colonial shares, Perak Hydro-Electrics gave way when the enemy invaded Malaya. This company had been striding ahead: the 1939 dividend of 2½ per cent. was followed next year by 6 per cent., while for the last completed twelvemonth, 7 per cent. was paid. Indian industrials reflected uneasiness produced by the Japanese war campaign. Victoria Falls ordinary shares steadily improved almost month by month.

Dividend Distribution

The question is constantly recurring as to what principles should govern directors in their dividend policy; whether, that is to say, they should concentrate upon putting their company into an invulnerable position as regards cash, or whether they should distribute as substantial a part of the profits as will please their shareholders without at the same time injuring the financial position of the concern. The matter is daily debated at board meetings, and from the majority of company reports now being issued it would appear as though directors realise the advisability of paying as much as is prudent so long as a company's position is not weakened in any way. A cross-current in these deliberations is the need for accumulating stores and stocks to a greater extent than would be considered necessary were it not for the need for safeguarding the future and for providing against possible interruption of supplies. The shareholder in these days reasonably argues that not only does he want as much money as he can obtain, for living purposes, but in addition, he requires any excess capital that he can accumulate in order to increase his subscription to one or other of the national war issues.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

1940

2527. "Automatic ticket machines." Westinghouse Brake & Signal Co., Ltd., W. E. Burnett and S. M. Dixon. February 9th, 1940. (541647.)

9185. "Means for controlling electron-discharge, and arrangements relating thereto." Standard Telephones & Cables, Ltd. July 29th, 1939. (541623.)

9358. "Cut-outs for electric spark distributors for internal combustion engines and the like." British Thomson-Houston Co., Ltd., and L. Griffiths. May 28th, 1940. (541590.)

9401. "Means for testing electric batteries." J. Roberts. May 29th, 1940. (541686.)

9425. "Electrodes for discharge devices wherein an electric discharge passes through a gaseous medium." General Electric Co., Ltd., B. N. Clack and C. E. Ransley. May 29th, 1940. (541550.)

9468. "Electrical signalling systems and apparatus for use therein." Automatic Telephone & Electric Co., Ltd., and J. F. Mackenzie. May 30th, 1940. (541553.)

9477. "Apparatus for toughening glass." Pilkington Bros., Ltd. July 13th, 1939. (541554.)

9481. "Sockets adapted to co-operate with two-pin lamp caps." General Electric Co., Ltd., and C. G. Eden. May 30th, 1940. (541556.)

9495/9496. "Electrical measuring apparatus." Kapella, Ltd., and R. E. Reason. May 30th, 1940. (541627/541628.)

9499. "Commutators for dynamo electric machines." Hoover, Ltd., and C. B. Wilson. May 30th, 1940. (541557.)

9526. "Apparatus for registering electrical impulses." British Tabulating Machine Co., Ltd. (International Business Machines Corporation.) May 30th, 1940. (541688.)

9528. "Cartridge fuses and switchgear incorporating said fuses." Electric Transmission, Ltd., and K. Dannenberg. May 31st, 1940. (541562.)

9548. "Electrode mounting arrangements for electron discharge devices." British Thomson-Houston Co., Ltd. May 31st, 1939. (541629.)

9561. "Suction cleaners." Hoover, Ltd. August 11th, 1939. (541563.)

9583. "Brushgear for electric motors." C. E. Gossling, and Small Electric Motors, Ltd. May 31st, 1940. (541564.)

9592. "Electron-discharge tubes and methods of manufacturing such tubes." Baird Television, Ltd., and K. A. R. Samson. June 1st, 1940. (541567.)

9627. "Systems for determining the direction of propagation of electromagnetic waves." Standard Telephones & Cables, Ltd. June 3rd, 1939. (541657.)

9628. "Oscillographs and cathode-ray tubes therefor." Standard Telephones & Cables, Ltd., and C. N. Smyth. June 1st, 1940. (541569.)

9662. "Traffic control systems." Automatic Telephone & Electric Co., Ltd., T. P. Preist, and G. W. Thompson. June 3rd, 1940. (541658.)

9762. "Electron-discharge devices for operation at very high frequencies." Standard Telephones & Cables, Ltd., and F. D. Goodchild. June 4th, 1940. (541664.)

9763. "High-frequency wave transmission systems." Standard Telephones & Cables, Ltd., W. A. Beatty and C. T. Scully. June 4th, 1940. (541665.)

9764. "High-frequency current indicators, and systems incorporating such indicators." Standard Telephones & Cables, Ltd., and C. N. Smyth. June 4th, 1940. (541666.)

9817. "Steam generators." A. Polanyi and Ruths International Accumulators, Ltd. June 5th, 1940. (541689.)

9859. "Electrolyte absorbent for primary and secondary batteries." C. L. Walsh and A. A. Newman. June 5th, 1940. (541696.)

9974. "Directional antenna systems." Standard Telephones & Cables, Ltd. August 18th, 1939. (541593.)

9976. "Means for controlling electronic discharges and devices making use thereof." Standard Telephones & Cables, Ltd. June 15th, 1939. (541631.)

9990. "Supply arrangements for control circuits of electric-discharge apparatus." British Thomson-Houston Co., Ltd. (Soc. Générale de Constructions Electriques et Mécaniques [Als-Thom]). June 7th, 1940. (541632.)

10075. "Electric incandescent flashlamps." British Thomson-Houston Co., Ltd. June 9th, 1939. (541699.)

10696. "Magnetic deflecting means for electron-discharge devices." Baird Television, Ltd., G. L. Hamburger and H. S. Peirce. June 21st, 1940. (541596.)

10709. "Directional antenna systems." Standard Telephones & Cables, Ltd. August 2nd, 1939. (541669.)

10953. "Electric wave transmission networks." Electrical Research Products, Inc. August 4th, 1939. (541634.)

11009. "Plasticised polyvinyl chloride products." British Thomson-Houston Co., Ltd. June 29th, 1939. (541597.)

11040. "Racks for clamping conduits, cables, and the like." Walsall Conduits, Ltd., and A. E. Millard. June 29th, 1940. (541574.)

11706. "Valves, particularly for compressors." British Thomson-Houston Co., Ltd. July 14th, 1939. (541578.)

12042. "Transparent or translucent closures for openings." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. July 23rd, 1940. (541579.)

12187. "Alloys suitable for bearing surfaces." British Thomson-Houston Co., Ltd. (General Electric Co.). July 26th, 1940. (541580.)

12548. "Fastening together of machine elements by bolts or the like." English Electric Co., Ltd., and D. G. Bratby. August 3rd, 1940. (541584.)

13284. "Circuit arrangements employing critical transit time electron-discharge devices." Standard Telephones & Cables, Ltd. February 17th, 1940. (541604.)

13285. "Phase controlling systems using electron beam discharge tubes." Standard Telephones & Cables, Ltd. November 18th, 1939. (541704.)

14456. "Electric lighting fittings." British Thomson-Houston Co., Ltd., and L. Hubble. September 23rd, 1940. (541706.)

15108. "Electric air-break circuit-breakers." British Thomson-Houston Co., Ltd. October 11th, 1939. (541612.)

15627. "Damping magnets for electric induction disc meters." British Thomson-Houston Co., Ltd. October 24th, 1939. (541708.)

17137. "Cooling means for electrical induction apparatus." British Thomson-Houston Co., Ltd. December 1st, 1939. (541616.)

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213. "Luminaires for under-water use." British Thomson-Houston Co., Ltd. January 5th, 1940. (541637.)

743. "Method of and apparatus for the manufacture of figure drums or rollers chiefly designed for use in counting mechanism." Landis & Gyr, Soc. Anon. January 23rd, 1940. (541709.)

2321. "Controllers for the time operation of electric switches, gas-valves and the like." F. O. Horstmann, J. H. G. Horstmann, C. W. Thorne, and Horstmann Gear Co., Ltd. February 20th, 1941. (541711.)

2562. "Temperature control of electric stove ovens." R. Haddan (Moffats, Ltd.). February 25th, 1941. (541677.)

3879. "Ganged electric condensers." General Electric Co., Ltd., J. B. L. Foot and W. B. Turner. March 21st, 1941. (541712.)

14304. "Electrode mounting arrangements for electron-discharge devices." British Thomson-Houston Co., Ltd. May 31st, 1939. (Divided out of 541629.) (541645.)

Amended Specification.

529792. "Selenium and like rectifiers." Westinghouse Brake & Signal Co., Ltd., and another.

The Belfast Controller

Further Discussion of Situation

SINCE the announcement of the Northern Ireland Minister of Commerce that he had appointed Mr. H. Boyd as Controller of the Belfast Corporation electricity undertaking, the Electricity Committee has passed a resolution asking for the cancellation of the appointment and the matter has been raised in the Northern Ireland House of Commons.

Lt.-Col. Gordon asked the Minister to state what salary was to be paid to the Controller and in reply Sir Basil Brooke said that Mr. Boyd had intimated that he did not require remuneration. If, however, his new duties interfered seriously with his professional work the question of remuneration would be re-opened by the Ministry. Lt.-Col. Gordon asked if it was a fact that the technical adviser was to be paid a fee of approximately £40,000 by way of commission.

"Not in Public Interest"

Sir Basil Brooke replied that he had stated on September 2nd in answer to a question on the same subject by another member that the fees of the services of Messrs. Kennedy and Donkin, who were the Ministry's consultants in connection with emergency supplies of electricity, had been approved by the Imperial Treasury and were related to the actual cost of providing those supplies. To give the amount of those fees would disclose to the enemy the nature of the work involved, and so it was not in the public interest to do so. The fees were paid to the firm and Mr. G. F. Kennedy did not receive personal remuneration for acting in an advisory capacity to the Ministry?

Mr. J. W. Nixon suggested that the Minister's reason for not divulging the amount was that he was afraid of public opinion, but the Minister refuted this allegation.

On the motion for the adjournment the matter was again raised by Mr. H. Midgley, who asked why the Belfast Corporation, which had developed an excellent policy, should be treated so undemocratically. Did the Minister hope to achieve a form of merger by appointing a Controller who would be advised by the consultants who advised the Ministry?

In congratulating the Minister on his choice of Controller, Major Hall-Thompson asked why he was not appointed to control the whole of the electricity supply of Northern Ireland. But he also considered that the appointment was an insult to the Belfast Electricity Committee which had a well-organised, well-run and prosperous undertaking. The Minister was introducing an unnecessarily expensive scheme. He would have had more confidence in the future arrangements if the Central Electricity Board had been asked for the loan of its engineer, Mr. Johnstone Wright, who had expert knowledge of amalgamation and experience in Northern Ireland.

In reply, Sir Basil Brooke maintained that his only consideration was how Northern Ireland could best contribute to the prosecution of the war. He could not give details of the electricity position as it would be divulging information of value to the enemy. He could say, however, that electricity supply in Belfast was not in a satisfactory position for war purposes. The supply had never failed, but it was by good luck that it had not been wholly cut off by enemy bombs. According to the ordinary Treasury arrangement Mr. Kennedy would be paid 5 per cent. on any work carried out, but in this case it had been reduced to 4 per cent. He concluded by hoping that the Electricity Committee would decide to co-operate with the Controller.

Registered Electrical Contractors

AT the last meeting of the National Register of Electrical Installation Contractors the following applications for registration were accepted:—Eagle Electrical Engineering Co., Plymouth; Pulver & Co., Ltd., 3, Berners Street, London, W.1; C. T. Brown, 105, Forest Road, Dalston, London, E.8; W. Thomasson & Co., Shrewsbury; Rowland E. Pepper & Co., Hull. At the same meeting one application was withdrawn and two declined.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Birmingham.—January 14th. Salvage Department. Lead-plate batteries for electric refuse collection vehicles. (December 19th.)

Dundee.—January 7th. Electricity Department. Supply and erection of structural steelwork at generating station. Schedules, etc., from city electrical engineer, Dudhope Crescent Road, Dundee. Tenders to town clerk.

Kilmarnock.—January 15th. Town Council. Various works, including electrical at men's rest room, and alterations and additions to slaughter-house. Specifications, etc., from the burgh surveyor.

Plymouth.—January 17th. Electricity Supply Department. Corrugated copper expansion pieces for circulating water system. (See this issue.)

South Africa.—POST OFFICE DEPARTMENT.—March 26th. Automatic exchange equipment for Cambridge, East London. P.O. Tender 16.

Southport.—January 3rd. Corporation. Maintenance of two electric lifts at the new police headquarters. (December 12th.)

Orders Placed

Chester.—Electricity Committee. Recommended, subject to approval of the Electricity Commissioners. Electrical equipment required for switchgear segregation at a switching sub-station.—Metropolitan-Vickers Electrical Co., Ltd.

Middlesbrough.—Town Council. Accepted. Cable (£730).—Britannic Electric Cable & Construction Co., Ltd. Renovation of emergency lighting plant at Grathorne Hall Auxiliary Hospital at a cost of about £1,000.—Chloride Electrical Storage Co., Ltd.

Shipley.—Health Committee. Accepted. Electrical installation at Victoria Park day nursery (£90).—Collinson Bros.

Electricity Committee. Accepted. Electric vehicle (£379).—Partridge, Wilson & Co., Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Altrincham.—Electric lighting installations in communal and public air-raid shelters; E. M. Slater, borough surveyor, Town Hall.

Ardwick.—Works canteen; Fletcher Bros. (North-Western), Ltd., North Western Street, Manchester, 12.

Ashton-under-Lyne.—Day nursery at West End Council School; A. Morris & Co. (Builders), Ltd., Duke Street.

Consett.—Canteens at Langley Park, Crookhall and Medomsley; J. J. Eltringham, architect, Derwent Street, Blackhill, Co. Durham.

Denton.—Auxiliary fire station; J. B. Cooke, surveyor to the U.D.C., Town Hall, Denton, near Manchester.

Dumplington.—Additions; Ford Motor Co., Dagenham, Essex.

Dundee.—Houses for Corporation Housing Committee; city architect.

Easington (Co. Durham).—Colliery canteen. E. M. Lawson, architect, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Eston (Yorks).—Wartime nursery on the South Bank estate; U.D.C. surveyor.

Great Ayton (Co. Durham).—Workers' hostel: Cackett, Burns Dick & McKellar, architects, Ellison Place, Newcastle-on-Tyne.

Hull.—Restaurant and ambulance station; city engineer.

Kidderminster.—Health Centre; J. Hawcroft, borough surveyor, 110, Mill Street.

Manchester.—Extensions, Cheetham; Tools & Gauges, Ltd., 82, Princess Street.

Micklefield.—Canteen at pithead, Peckfield and Ledsham Luck Collieries; Briggs, Sons & Co., Ltd., colliery proprietors, Eastwood, Nottingham.

Middleton.—Canteen at works; Manchester Proofing Co., Ltd., Wood Street Dyeworks.

Northampton.—Nurseries (£1,800); borough engineer.

Southport.—Emergency feeding centres; borough engineer.

Stockport.—Day nurseries at Reddish and at Mersey Square; W. F. Gardner, Town Hall, St. Peter's Square.

Swinton and Pendlebury.—Electric lighting and heating in dormitory, communal and public shelters; A. Cordwell, borough surveyor, Town Hall, Chorley Road, Swinton, Lancs.

Synsdale.—Canteen, Haigh Moor Colliery (G. A. Charlton, manager); Briggs, Sons & Co., Normanton.

Trafford Park.—Decontamination centre, dairy and store to works; F. Hills & Sons, Trafford Park Road, Manchester, 17.

Wakefield.—Day nursery, Cathedral School site; S. G. Wardley, city architect, Town Hall.

Waterhead.—Mill canteen; Heywood & Ogden, architects, 1, St. Peter's Square, Oldham.

Weaste.—Rebuilding Block "C" at Hope Hospital; W. A. Walker, city engineer, Town Hall, Bexley Square, Salford, 3.

West Riding.—Additional school accommodation at Horsforth (£11,000), Guiseley (£7,500), Yeadon Henshaw (£6,500), Boston Spa (£6,000), and Bawtry (£6,000); county architect, Wakefield.

Willenhall.—British Restaurant; Noel D. Martin, surveyor, Town Hall.

York.—Six additional feeding centres at municipal schools; C. J. Minter, city engineer, Guildhall, York.